SY31-9020-2

5364 System Unit Maintenance Library
Maintenance Information
Parts Catalog

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Parts Catalog

Third Edition (January 1986)

This major revision makes obsolete SY31-9020-1.

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About This Manual

Who Should Use This Manual

This manual contains the procedures and information needed to service or repair the IBM 5364 System Unit.

How This Manual Is Arranged

This manual includes:

- A table of contents showing all the major sections of this manual, and the page on which each section starts
- A section contents page showing all procedures in the section
- Sections containing maintenance procedures
- Two appendixes containing information on:
  - Safety inspections
  - Electrostatic discharge sensitive logic cards
- A glossary of terms and abbreviations used in this manual
- Two sections located between the glossary and the index:
  - A parts catalog
  - The service log
- An index containing key words to procedures in this manual

If You Need More Information

Customer/Operator Information

- *Setting Up Your Computer—5364*, SA21-9505. Contains procedures to:
  - Install the system
  - Check out the system
  - Perform the system configuration
- *Operating Your Computer—5364*, SC21-9085. Contains information and procedures to:
  - Use the system help menus
  - Use the personal computer keyboard to operate the 5364 System Unit
  - Switching between the personal computer and System/36
  - Operate the 5364 unit
  - Perform customer level problem determination
- *System Messages*, SC21-7938. Contains the system, licensed program, and utility program displayed messages, their causes, and their recovery procedures.
- *Enhanced 5251 Emulation Program Keyboard Templates,* SX21-9805. Shows the keys on the personal computer keyboard that correspond with the 5251 keyboard.

Service Information

- *Personal Computer and Personal Computer-XT 5364 Driver Card Guide to Operations*, GA21-9809. Contains information and procedures to:
  - Install the driver card
  - Perform customer level problem determination
- *IBM Personal Computer AT® 5364 Driver Card Guide to Operations*, GA21-9811. Contains information and procedures to:
  - Install the driver card
  - Perform customer level problem determination
- *Functions Reference Manual*, SA21-9436. Contains information needed to understand the system from a hardware point of view, including:
  - System instructions
  - Status bytes
  - Controls and indicators
  - Device specific information
- *System Reference Codes,* SY31-9027. Contains valid SRCs with probable failing FRUs, FRU part numbers, and maintenance information references.

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Safety

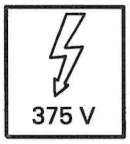
Danger and Caution Notices

In this manual, the word *DANGER* informs you of conditions that could cause personal injury or death. (The word *HAZARDOUS* or *WARNING* may appear on machine labels and field-supply items.) The word *CAUTION* informs you of an action that could cause damage to a program, to a device or system, or to data.

There are blank lines below each notice. You can write these notices in your own words on the blank lines.

Safety Label

The following safety label is a danger notice.



B9020001-0

Meaning: Voltage is present with machine power on.

Caution Notices in This Manual

Caution notices appear in the following procedure:

- "Disk Drive Reload" on page 1-12

Rules for Safety

If you know the safety rules for working with electrical and mechanical equipment, and if you observe the rules, you can work safely with IBM equipment.

Do not fear electricity, but respect it.

While you are maintaining IBM equipment, observe every safety precaution possible and the following safety rules.

Work Environment

- Do not work alone in hazardous conditions or near equipment that has dangerous voltage.
- Always look for possible hazards in your work environment. Examples of hazards are: moist floors, nongrounded extension cables, power surges, and missing grounds.
- Do not perform any action that makes the product unsafe or that causes hazards for customer personnel.
- Before you start the equipment, ensure that other service representatives and customer personnel, are not in a hazardous position.
- Care should be taken to make certain that hair and clothing does not:
  - Get caught in moving parts
  - Contact live parts that may involve the risk of electric shock
- Lift the equipment or parts by standing or pushing up with your stronger leg muscles; this action removes the strain from the muscles in your back. Do not lift any equipment or parts that are too heavy for you.
- Put removed machine covers in a safe place while you are servicing the machine. Reinstall the covers before returning the machine to the customer.
- Always keep your tools away from walk areas so that people cannot trip over them.
- Observe good housekeeping practices in the area of the machines while you are performing maintenance and after completing it.
- After maintenance, reinstall all safety devices, such as guards, shields, labels, and grounding devices. Exchange safety devices that are worn or defective. Remember, the safety devices protect you from a hazard. You destroy their purpose if you do not reinstall them when you have completed the service call.

Electrical Safety

- Always disconnect the power cord before you work on a machine.

  Note: A non-IBM attachment to an IBM machine may be powered from another source and may be controlled by a different switch or circuit breaker.

- Switch off all power and disconnect the power cord before:

  - Removing or assembling the main units of the equipment
  - Working near power supplies
  - Inspecting power supplies
  - Installing changes in machine circuits

- If you really need to work on equipment that has exposed live electrical circuits, observe the following precautions:

  - Ensure that another person who understands the power off controls, is near you. Another person must be there to switch off the power, if necessary.
  - Do not wear jewelry, chains, metal-frame eyeglasses, or other personal metal objects. Remember, if the metal touches the machine, the flow of current increases because the metal is a conductor.
  - Use only insulated probe tips or extenders. Remember, worn or cracked insulation is unsafe.
  - Use only one hand while you are working on live equipment. Keep the other hand in your pocket or behind your back. Remember, there must be a complete circuit for an electrical shock to occur. This precaution prevents your body from completing the circuit.
  - When you use a tester, set its controls correctly and use insulated probes that have the correct electrical specification.
  - Do not touch objects that are grounded, such as metal floor strips, machine frames, or other conductors. Use suitable rubber mats obtained locally, if necessary.

- Never assume that power has been removed from a circuit. First, ensure that power has been removed.

- If an electrical accident occurs:

  - Use caution. Do not be a victim yourself.
  - Remove the power plug from the customer outlet.
  - Obtain immediate medical aid.

Mechanical Safety

Do not touch moving mechanical parts when you are lubricating a part, checking for play, or doing other similar work.

Summary

Prevention is the main aid to electrical safety. Always think about electrical safety and use good practice; for example:

- Ensure that the customer's power receptacle matches the IBM equipment specifications.
- Inspect power cables and plugs; check for loose, damaged, or worn parts.
- Review the procedures in the maintenance documents before you remove a part that can hold an electrical charge from the machine. Carefully discharge the necessary parts exactly as instructed by the procedure.

Never assume that a machine or a circuit is safe. No machine is always completely safe. You may not know the exact condition of a machine because, for example:

- The power receptacles could be wrongly wired.
- Safety devices or features could be missing or defective.
- The design could have a problem.
- The machine could have damage, caused when it was shipped.
- The machine could have an unsafe change or attachment.
- A part could be defective, therefore causing a hazard.
- A part could be wrongly assembled.

These are some of the ways that the condition of the machine could affect safety. Before you start a service call or procedure, use good judgment and caution.

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How to Diagnose 5364 Problems (Start Here)

1. If customer problem determination has not already been run, see *Operating Your Computer—5364* to perform problem determination. Problem determination is used to isolate the problem to the personal computer or the 5364. The procedures in this manual assume that the personal computer is operating correctly as a personal computer. See Note 2.

2. When possible, use the system reference code (SRC) reported by the customer to isolate the failing FRU. See *System Reference Codes* to find out what FRU is associated with an SRC.

3. Use the tables that follow to isolate failing FRUs:

   - When no SRC is available.
   - When a FRU identified by an SRC was exchanged, but the problem was not fixed.

   Perform the action in the tables for the symptom that best describes the type of failure.

4. Use the following procedures in this section when directed by an SRC:

   - "Power Good Line" on page 1-10
   - "Channel Isolation Procedure" on page 1-22
   - "Memory Card Failures (256K Card Only)" on page 1-23
   - "1.7 Volt Regulator FRU Isolation Procedure" on page 1-9

Notes:

1. *Perform preventative maintenance (PM) on the system unit on every hardware service call. See "Preventative Maintenance" on page 4-10.*

2. *The customer level diagnostics for the personal computer do not test the driver card in the personal computer. For customer level problem determination of the driver card, the customer should use:*

   a. ***Personal Computer and Personal Computer-XT 5364 Driver Card Guide to Operations,*** *GA21-9809*

   b. ***Personal Computer-AT 5364 Driver Card Guide to Operations,*** *GA21-9811*

Symptom	Action
5364 System Unit will not power on.	See "Power Failures" on page 1-7.
No SRC or symptom available.	Perform an IPL of the 5364 from disk using a modifier code of 0000 (see "How to Perform an IPL from Disk or Diskette" on page 1-5). If the IPL is successful, display the error history table to see if a FRU is identified by any SRCs that are shown (see "How to Display the Error History Table" on page 1-26). If an SRC is displayed, exchange the FRU indicated. Run SYSTEST for 10 minutes to verify if the problem is fixed (see "How to Run System Test" on page 1-25). If you cannot perform an IPL from disk and no SRC is displayed, see the action for *Cannot perform an IPL from disk* in this table.
Cannot perform an IPL from disk (normal customer load SSP operation).	Perform an IPL from diskette (see "How to Perform an IPL from Disk or Diskette" on page 1-5). If an SRC is displayed, exchange the FRU indicated. Run SYSTEST for 10 minutes to verify the problem is fixed (see "How to Run System Test" on page 1-25). If you cannot perform an IPL from disk or diskette, suspect one of the following FRUs: Control storage processor card (J6) Data storage adapter card (J8) Memory card (J3) Planar board If you can perform an IPL from diskette, but not from disk, suspect one of the following FRUs: Disk adapter card (J9) Disk drive assembly Disk drive cable assembly *Note: Before exchanging the disk drive, see the procedure for "Disk Drive Failures" on page 1-11.*
FRU exchanged but problem is still present.	Run system test for 10 minutes to see if an SRC is generated (see "How to Run System Test" on page 1-25). Display the error history table to see if additional FRUs are identified by any SRCs that are shown (see "How to Display the Error History Table" on page 1-26). See "Intermittent Failures" on page 1-24.

Symptom	Action
Memory card failures	If an SRC indicates a 256K memory card failure, see "Memory Card Failures (256K Card Only)" on page 1-23 to isolate the failing memory module. If an SRC cannot identify whether the memory card is a 256K or 1M card, or indicates a 1M card, see "Memory Card Removal" on page 3-14 to replace the failing FRU.
Disk failures	See "Disk Drive Failures" on page 1-11.
Diskette failures	Ensure that customer problem determination has been run. Perform an IPL from diskette to see if an SRC is generated (see "How to Perform an IPL from Disk or Diskette" on page 1-5). If you cannot do an IPL from diskette, see "Diskette Drive Failures" on page 1-13.
Local work station failures	See "Local Work Station Failures" on page 1-14.
Communications failures	See "Communications Failures" on page 1-18.
Intermittent failures	See "Intermittent Failures" on page 1-24.

How to Perform an IPL from Disk or Diskette

This procedure loads the SSP from disk or DCP from diskette. If the diagnostics fail, the Service Control menu is displayed with an SRC.

1. Power on the 5364 System Unit.

2. Power on the personal computer.

3. Load the DOS program into the personal computer:

   For personal computers without a disk drive:

   - Insert the DOS program diskette into diskette drive A of the personal computer.
   - Hold down the CTRL and ALT keys and press the DEL key.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (A>) is displayed.
   - Go to step 4.

   For personal computers with a disk drive:

   - DOS is loaded automatically when the personal computer is powered on, if there is no diskette in diskette drive A.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (C>) is displayed.

4. Load the S36 program into the personal computer:

   Note: If a batch file is set up, the S36 program is loaded automatically.

   For personal computers with the S36 program on the personal computer disk:

   - Type S36 and press the Enter key.

   For personal computers without a disk drive:

   - Insert the diskette labeled PC DSKT 01 in personal computer diskette drive A.

     *Note: If the 5364 is configured for graphics, you must use the **original** diskette labeled PC DSKT 01.*

   - Type S36 and press the Enter key.

     Note: If the DOS prompt is not A>, type A: and press the Enter key. The prompt will change to A>. This makes diskette drive A the default drive.

   Diagnostics check the following FRUs:

   Driver card in the personal computer
   Personal computer expansion cable to the 5364
   Receiver card in the 5364
   5364 planar board
   5364 memory card
   Communications card in the personal computer (if installed)

5. If an SRC appears on the display, or if the Service Control menu is displayed with an SRC, use the SRC to isolate the failing FRU.

6. If the Sign On display is shown or the service level is locked, change the service level to service. See "Changing the Service Level" on page 4-2

7. Do one of the following:

   To perform an IPL from diskette:

   a. Insert the diskette labeled MCODE DSKT 11 in the 5364 diskette drive.

   b. Select the option to display or alter the modifier code.

   c. Enter a modifier code of 0000.

   d. Select the option to configure, customize, or verify the system.

   e. Press the Enter key.

   To perform an IPL from disk:

   a. Select the option to perform an IPL from disk.

   b. Press the Enter key.

8. Diagnostics check the system and device interface logic in the 5364.

   If the diagnostics fail, the Service Control menu is displayed along with an SRC. Use the SRC to isolate the failing FRU.

   If you are here because you cannot IPL from disk, see the procedure "Disk Drive Failures" on page 1-11.

Power Failures

Use the power SRC reported by the customer and the following table to isolate the failing FRU.

SRC	Action
9901 Power supply fan not turning Customer circuit breaker is in the On position	An open circuit is present in the AC input to the power supply, or DC overcurrent is sensed by the power supply. See "Power Supply FRU Isolation Procedure" on page 1-8 to isolate the failing FRU.
9902 Customer circuit breaker trips when reset 5364 Power switch is in the Off position	A short circuit is present in the AC power cord or the power supply. Exchange the failing FRU.
9903 Power supply fan not turning Customer circuit breaker trips when reset 5364 Power switch is in the On position	A short circuit is present in the power supply. Exchange the power supply.
9904 Power supply fan is turning	An open circuit is present in the 'power good' line (P8 pin 1). See "Power Good Line" on page 1-10 to isolate the failure. Suspect one of the following FRUs: Driver card (in the PC) PC bus expansion cable Receiver card Power supply connector P8 not connected Power supply 1.7 volt regulator Planar board
9A19	A DC overcurrent condition is present on the 1.7 volt regulator. See "1.7 Volt Regulator FRU Isolation Procedure" on page 1-9.

Power Supply FRU Isolation Procedure

Use this procedure to isolate the failing FRU when an open circuit is present in the AC input to the power supply or when a DC overcurrent condition is present in the power supply. Each load is disconnected from the power supply to isolate the failure.

1. Power off the personal computer.
2. Power off the 5364.
3. Unplug the 5364 power cord from the customer outlet and the 5364.
4. Use an ohmmeter to verify that the power cord does not have an open circuit.

   If the power cord is OK, continue with the next step.
5. Remove the 5364 System Unit cover (see "System Cover" on page 3-2).
6. For each of the cards and connectors in the following list, perform steps a through d:

   P12 to disk drive A
   P11 to the diskette drive
   P10 to disk drive B (if installed)
   1.7 V regulator assembly (see note)
   J19 to the 5364 fan
   Receiver card (J1)
   Memory card (J3)
   MSP data flow card (J4)
   MSP control card (J5)
   CSP card (J6)
   WS adapter card (J7)
   DSA card (J8)
   Disk adapter card (J9)

   Note: Loosen the screw that holds the regulator assembly to the frame. Unplug the regulator assembly from the planar board and set it out of the way so that the regulator does not short circuit with the 5364.

   a. Remove the card or connector.

   b. Power on the 5364.

   c. If the power supply fan runs, the FRU that is disconnected or the card that is removed is the failing FRU. Power off the 5364 and install a new card or FRU.

   d. If the power supply fan still does not run, power off the 5364, reinstall the connector or card and repeat steps a through d for the next item on the list.

      If all of the cards and connectors have been removed and the problem is still present, power off the 5364 and continue with the next step.
7. Unplug power supply connectors P8 and P9 from the planar board.
8. Power on the 5364.

   If the power supply fan runs, install a new planar board.

   If the power supply fan still does not run, power off the 5364 and continue with the next step.
9. Disconnect P13 (see "Power Supply" on page 3-3) from the left side of the power supply. Use a drive socket to remove the shield that covers the connector.
10. Use an ohmmeter to measure the resistance between pins 1 and 3, and pins 2 and 3 on the cable assembly connector. See "DC Voltage Distribution" on page 2-9 for the connector pins.

    If a short circuit is present, disconnect the cable from the regulator and repeat the above step to determine if the cable has a short circuit or if the regulator has a short circuit. Exchange the FRU with the short circuit and install a new power supply.

    If a short circuit is not measured, exchange the power supply.
11. Reconnect or install all FRUs that were removed in the preceding steps.

1.7 Volt Regulator FRU Isolation Procedure

Use this procedure to isolate the failing FRU when a DC overcurrent condition is present on the 1.7 volt regulator (SRC 9A19).

1. Power off the 5364 System Unit.

2. Remove the 5364 System Unit cover (see "System Cover" on page 3-2).

3. Remove the memory card (J3).

4. Perform steps a through c for each of the following cards:

   MSP data flow card (J4)
   MSP control card (J5)
   CSP card (J6)
   WS adapter card (J7)
   DSA card (J8)

   a. Remove the card.

   b. Power on the personal computer and the 5364.

   c. Perform an IPL (see "How to Perform an IPL from Disk or Diskette" on page 1-5).

      If a 9A19 SRC is not displayed, the card that is removed is the failing FRU. Power off the personal computer and the 5364 and install a new card.

      If a 9A19 SRC is displayed, power off the 5364 and reinstall the card. Repeat steps a through c for the next card. If all the cards have been removed and the problem is still present, continue with the next step.

5. Power on the 5364.

6. Measure the +12 volts at the voltage test points on the planar board (see "Planar Board and Card Locations" on page 2-6).

   If the +12 volts is missing or not correct, exchange the power supply.

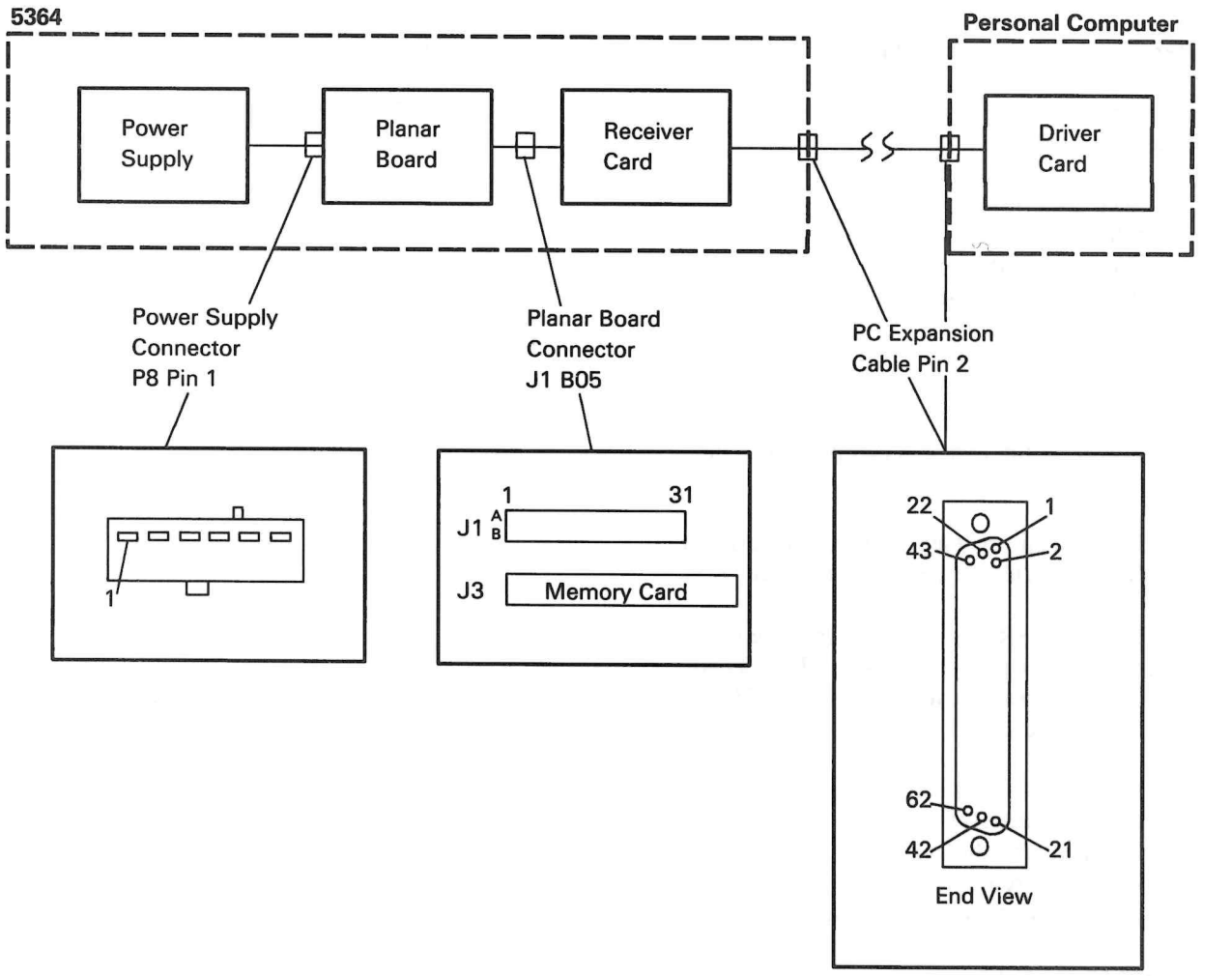
   If the +12 volts is OK, one of the FRUs in the following list is failing. The FRUs are listed with the highest probability of failure first.

   1.7 volt regulator
   Planar board
   1.7 volt regulator cable

Power Good Line

The 'power good' line supplies +3.0 V to +5.5 V to the driver card in the personal computer. The diagnostics check the driver card for +3.0 V to +5.5 V. SRC 9A07 is displayed if the power good line is not at the correct voltage level.

Power Good (+3.0V to +5.5V)



Disk Drive Failures

Perform the action for the symptom that best describes the type of failure.

Symptom	Action
Intermittent disk errors.	1. Power off the PC and the 5364 System Unit. 2. Remove the 5364 System Unit cover (see "System Cover" on page 3-2). 3. Reseat the cards and cables in the 5364 System Unit. 4. Reinstall the 5364 System Unit cover. 5. Power on the 5364 System Unit then power on the PC. 6. Perform an IPL of the 5364 from disk using a modifier code of 0000 (see "How to Perform an IPL from Disk or Diskette" on page 1-5). If an SRC is displayed, exchange the FRU indicated. Run SYSTEST for 10 minutes to verify the problem is fixed (see "How to Run System Test" on page 1-25 and "How to Display the Error History Table" on page 1-26).
Cannot perform an IPL from disk. An SRC indicates that the disk drive is bad. *Notes:* *1. See "How to Perform an IPL from Disk or Diskette" on page 1-5.* *2. The S36 program can cause wrong SRCs if there is a PC hardware failure or if the program microcode is bad.*	Perform the Disk Drive Reload procedure on the following page to verify that the failure is not caused by bad data on the 5364 disk drive.

Disk Drive Reload

This procedure is used to determine if the disk drive A failure is caused by bad system microcode, bad SSP microcode, or bad data.

1. **Reload the system microcode to disk drive A and perform an IPL from disk. See the following:**

   a. "How to Reload the System Microcode" on page 4-4

   b. "How to Perform an IPL from Disk or Diskette" on page 1-5

   If an SRC is displayed or if the IPL is not successful, continue with the next action. If the IPL is successful, run system test to verify that the problem is fixed. See "How to Run System Test" on page 1-25.

2. **Reload the SSP diskettes to disk drive A and perform an IPL from disk. See the following:**

   a. Chapter 10 in *Operating Your Computer—5364*

   b. "How to Perform an IPL from Disk or Diskette" on page 1-5

   If an SRC is displayed or if the IPL is not successful, continue with the next action. If the IPL is successful, run system test to verify that the problem is fixed. See "How to Run System Test" on page 1-25.

CAUTION

The customers data will be destroyed when you initialize the disk. To minimize the exposure of destroying customer data, read the note that follows.

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Note: An alternative method to initializing disk drive A is to install a new disk drive before performing the following steps. If the new disk drive fails, use the list of FRUs at the end of this procedure to isolate the problem. It may be necessary to reinstall the old disk drive and attempt to initialize the disk to remove customer data.

3. **Initialize disk drive A, reload the system microcode to disk, reload the SSP diskettes to disk, and perform an IPL.**

   a. Hold down the ALT key and press the ESC key. Repeat this step until the Session Selection menu is displayed.

   b. Select the option for a service session (the Service Control menu is displayed).

   c. Insert the diskette labeled MCODE DSKT 11 in the 5364 diskette drive.

   d. Select the option to initialize the disk. Follow the prompts.

   e. Reload the 5364 microcode (see "How to Reload the System Microcode" on page 4-4).

   f. Perform an IPL of the 5364 from disk using a modifier code of 0000 (see "How to Perform an IPL from Disk or Diskette" on page 1-5).

   If the IPL is successful, run system test to verify that the problem is fixed. See "How to Run System Test" on page 1-25.

   If an SRC indicated that the disk drive is the failing FRU, install a new drive. The following FRUs can cause IPL failures:

   Disk drive assembly
   Disk adapter card (J9)
   Data storage adapter card (J8)
   Disk/diskette cable assembly
   Control storage processor card (J6)
   Planar board
   Main storage processor cards (J4 and J5)

Diskette Drive Failures

Symptom	Action
Intermittent diskette drive errors *Note: Radio frequency interference (RFI) may cause errors on the diskette drive when the 5364 cover is removed.*	Display the error history table to see if a FRU is identified by any SRCs that are shown (see "How to Display the Error History Table" on page 1-26). 1. Power off the PC and the 5364 System Unit. 2. Remove the 5364 System Unit cover (see "System Cover" on page 3-2). 3. Reseat the cards and cables in the 5364 System Unit. 4. Reinstall the 5364 System Unit cover. 5. Power on the 5364 System Unit then power on the PC. 6. Perform an IPL of the 5364 from diskette using a modifier code of 0000 (see "How to Perform an IPL from Disk or Diskette" on page 1-5). If an SRC is displayed, exchange the FRU indicated. Run SYSTEST for 10 minutes to verify the problem is fixed (see "How to Run System Test" on page 1-25). *Note: Customer problem determination attempts to isolate problems to the diskette drive or the diskettes being used. If you want to run the diskette tests, enter TESTDSKT ("Service Procedures under SSP" on page 4-7) on the command line and press the Help key.*
Cannot perform an IPL from diskette. *Note: See "How to Perform an IPL from Disk or Diskette" on page 1-5.*	If you cannot perform an IPL from diskette and no SRCs are generated, suspect the following FRUs: Missing voltage (see "DC Voltage Distribution" on page 2-9) Data storage adapter (DSA) card Diskette drive Disk/diskette cable assembly *Note: Customer problem determination attempts to isolate problems to the diskette drive or the diskettes being used. If you want to run the diskette tests, enter TESTDSKT ("Service Procedures under SSP" on page 4-7) on the command line and press the Help key.*

Local Work Station Failures

Symptom	Action
Intermittent work station failures	Use the following tests or procedures to isolate the failing FRU: "How to Run System Test" on page 1-25 "How to Display the Error History Table" on page 1-26
One or more work stations failing, system console (PC) working correctly	Run the network analysis program to identify all failing work stations. See "Network Analysis Program" on page 1-15. Use the results of the network analysis program and the following information to isolate the failing FRU: See the "Twinaxial Cable Ohmmeter Procedure" on page 1-17 to check the cable to a failing work station. See the maintenance manual for the failing work station for diagnostic information.
All work stations on the twinaxial connector failing	Suspect the following FRUs: Work station adapter card (J7) Twinaxial connector and cable assembly (J17) Twinaxial cable to the work station(s) Planar board *Note: See "Twinaxial Cable Ohmmeter Procedure" on page 1-17 to check the work station cable.*
System console (PC) failing	Suspect the following FRUs: Planar board System microcode bad (see "How to Reload the System Microcode" on page 4-4) Work station adapter card (J7)

Network Analysis Program

The network analysis program can be used to isolate problems with local work stations attached to the system. You need to know the customer assigned address of each work station attached to the port.

The network analysis option displays a matrix on the system console (personal computer). The matrix shows the following information:

- All possible cable and station addresses for work stations across the top of the matrix.
- The conditions sensed for each address down the side of the matrix.

An X is placed at the position of the work station address and the condition that was sensed. The correct responses are as follows:

- Work station display: An X in the single-frame row.
- Work station printer: An X in the single-frame row for the first condition sensed and an X in the multiframe row for following conditions sensed.

  Note: An X is placed in the single-frame row for the address of the personal computer attached printer even though the printer may not be attached or powered on.

- No work station at the address: An X in the no-response row.

The following FRUs are partially tested:

Work station adapter card
Control storage processor card
Planar board
Twinaxial cable and connectors
Work stations

To run network analysis:

1. The service level must be set to Service. See "Changing the Service Level" on page 4-2.
2. Hold down the CTRL and ALT keys and press the DEL key (2 times).
3. Insert the diskette labeled MCODE DSKT 11 in the 5364 diskette drive.
4. Select option 9 (*Display or alter the modifier*). Enter a modifier code of 0000.

   Note: 0000 must be keyed in regardless of the modifier code shown on the display.

5. Select the option to configure and customize the system.
6. When the DCP menu is displayed, select the Network Analysis option.

   The system displays a status matrix on the personal computer after approximately 30 seconds.

7. Use the table on the following page and the matrix that is displayed on the system console (personal computer) to isolate the failure.
8. To end network analysis:

   a. Hold down the CTRL and ALT keys and press the DEL key (2 times).

   b. Change service level to normal. See "Changing the Service Level" on page 4-2.

Condition Sensed	Failing FRU or Action
Single-frame or multiframe	If the condition was sensed at an address where there is no work station, ensure that: 1. The address switches on the work station are set correctly. 2. The terminator switch on the work station (if present) is set correctly. *Note: An X is placed in the single-frame row for the address of the PC attached printer even though a printer may not be attached or powered on.* If a work station display responded with a multiframe condition, see the device maintenance manual to isolate the failure. A multiframe response from a work station display is not valid. If a work station printer failed to respond with the multiframe condition, see the device maintenance manual to isolate the failure. The work station printer failed to perform the modeset command.
No response	If a work station did not respond: 1. Verify that the work station is powered on. 2. Verify that the address and terminator switches are set correctly. 3. Check the twinaxial cable (see "Twinaxial Cable Ohmmeter Procedure" on page 1-17). 4. If the above steps are OK, exchange the work station adapter card (J7). If a work station printer failed to respond, also see the action under single-frame or multiframe condition.
Buffer parity check	Work station adapter card (J7).
Serial parity check	Work station adapter card (J7).
Driver activity check	Suspect the following FRUs: Work station adapter card (J7) Short circuit in the work station cable (see "Twinaxial Cable Ohmmeter Procedure" on page 1-17)

Twinaxial Cable Ohmmeter Procedure

Twinaxial cable problem determination is a customer responsibility.

This procedure is supplied to enable you to check the twinaxial cable in the event the customer requests your assistance.

1. Power off all work station devices attached to the twinaxial cable.

2. Disconnect the twinaxial cable from the 5364.

3. Set the ohmmeter to the times 10 scale (x10).

4. Measure the resistance between each pin and the ground shield of the twinaxial cable.

   If the resistance is less than 20 ohms (short circuit) or more than 200 ohms (open circuit), repair or exchange the cable. See notes.

5. Measure the resistance between the two pins of the twinaxial cable.

   If the resistance is less than 80 ohms (short circuit), repair or exchange the cable. See notes.

6. Disconnect the twinaxial cable from the last work station on the port. The 5364 end of the twinaxial cable should still be disconnected.

7. Measure the resistance between each pin of the twinaxial cable and the ground shield of the twinaxial cable.

   If the resistance is less than 200 ohms (short circuit), repair or exchange the cable. A low resistance can also be caused by a terminating resistor on the planar board in a work station. See notes.

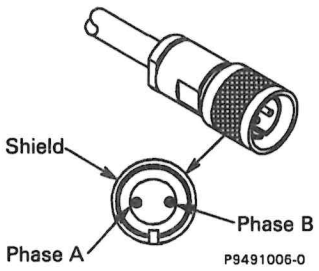
8. Measure the resistance between the two pins of the twinaxial cable.

   If the resistance is less than 200 ohms (short circuit), repair or exchange the cable. See notes.

9. At the work station end of the cable, jumper phase A of the connector to the shield.

   At the 5364 end of the cable, measure the resistance between phase A and the shield.

   If the resistance is more than 200 ohms, phase A and phase B are reversed. Remove the jumper and repair the cable. See notes.



Notes:

1. *If more than one work station is attached to the port, it may be necessary to disconnect each section of cable to determine the location of the failure.*

2. *The location of a short circuit or open circuit in a twinaxial cable may be determined by using **An Oscilloscope Measurement Procedure for Twisted and Coax Cables**, S226-3913.*

Communications Failures

Symptom	Action
Communication failures	See "Communications Problem Isolation" on page 1-19 to isolate the failing FRU.
Intermittent failures	1. Run system test with communications selected. See "How to Run System Test" on page 1-25. 2. Display the error history table to see if any SRCs are shown. See "How to Display the Error History Table" on page 1-26. 3. Display the communication line status to determine if data is being transmitted or received, and that the line status is correct. See "How to Display Communication Line Status" on page 1-20.

Communications Problem Isolation

1. If a job is running in personal computer mode, stop the job and start the failing communications job again.

   If the communications job runs OK, run the personal computer diagnostics to see if the personal computer hardware is causing the failure.

2. If a switched network is being used, dial another number to see if the failure is at the remote location or in the 5364 communications hardware.

3. Type COMMTEST on the SSP command line on the system console and press the Enter key. Follow the displayed instructions.

   The COMMTEST checks the hardware logic of the communications card in the personal computer and the cable to the personal computer.

   If the COMMTEST does not isolate the failure, continue with the next step.

4. Do one of the following:

   For systems with a BSC card in the personal computer:

   Type BSCTEST on the SSP command line and press the Enter key. Follow the prompts.

   The BSC online test checks the modem, the line, and the functions of the BSC card in the personal computer.

   For systems with an SDLC card in the personal computer:

   Type SDLCTEST on the SSP command line and press the Enter key. Follow the prompts.

   The SDLC online test checks the modem, the line, and the functions of the SDLC card in the personal computer.

5. If the failure is still present, display the communication line status to determine if data is being transmitted or received, and that the line status is correct. See "How to Display Communication Line Status" on page 1-20.

How to Display Communication Line Status

Use the following procedure to display the status of the communications line.

1. Hold down the ALT key and press the ESC key. Repeat this step until the Session Selection menu is displayed.

2. Select the option for a service session on the Session Selection menu.

3. Select the option to display the status of the communication line on the Service Control menu.

4. A continuous display of the line status is shown on the system console (PC). The indicators have the following meanings:

   DTR Data terminal ready

   DSR Data set ready

   RTS Request to send

   FBT Frame/block transmit end

   FBR Frame/block receive end

   CTS Clear to send

   CD Carrier detected

   When the DTR and DSR indicators come on, the line has been connected and the indicators now show the status of the communication line.

   When the DTR, DSR, RTS, CTS, and CD indicators are on and the FBT or FBR indicator is on, data is being transmitted or received by the 5364.

Note: If you select the option to display communication status from the Service menu, an asterisk (*) is used to indicate active and a blank is used to indicate not active.

To End Display Communication Line Status:

1. Press the F3 key.

2. Hold down the ALT key and press the ESC key.

3. Select the option for work station operations on the Session Selection menu.

EIA/CCITT Signal Pins

The following table shows the pins and signals on the communications cable.

Signal Name	Pin
Transmit data space (TDS)	2
Receive data space (RDS)	3
Request to send (RTS)	4
Clear to send (CTS)	5
Data set ready (DSR)	6
Signal ground (GND)	7
Received line signal detect (RLSD)	8
Select standby (SNBU)	11
New sync	14
Transmit signal element timing (TSET)	15
Receive signal element timing (RSET)	17
Test control (WRAP)	18
Data terminal ready (DTR)	20
Ring indicate (RI)	22
Rate select (SELECT)	23

Channel Isolation Procedure

1. Power off the personal computer.
2. Power off the 5364.
3. Remove the 5364 cover (see "System Cover" on page 3-2).
4. Remove the data storage adapter card (J8) from the planar.
5. Perform an IPL (see "How to Perform an IPL from Disk or Diskette" on page 1-5).
6. If a 2100 SRC is displayed, exchange the data storage adapter card (J8).
7. If any other SRC is displayed, exchange the following FRUs in order:

   CSP card (J6)
   WS adapter card (J7)
   Planar board

Memory Card Failures (256K Card Only)

This procedure isolates the failing module on the 256K memory card (J3).

1. Power on the 5364 System Unit.
2. Power on the personal computer.
3. Load the DOS program into the personal computer:

   For personal computers without a disk drive:

   - Insert the DOS program diskette into diskette drive A of the personal computer.
   - Hold down the CTRL and ALT keys and press the DEL key.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (A>) is displayed.

   For personal computers with a disk drive:

   - DOS is loaded automatically when the personal computer is powered on, if there is no diskette in diskette drive A.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (C>) is displayed.
   - Type A: and press the Enter key (the DOS prompt should change to A>).

4. Insert the diskette labeled PC DSKT 02 in personal computer diskette drive A.
5. Type CARDTEST and press the Enter key.

   If a failure occurs, a diagram of the memory card is shown on the display. The failing module is indicated by question marks (?). If the module is only half-filled with question marks, the failure was intermittent.

6. Record the number of the failing module(s).
7. Go to "Memory Card Module Removal (256K Card Only)" on page 3-13.

Intermittent Failures

This procedure ensures that 5364 System Unit internal connectors and cards are seated correctly.

1. Display the error history table to see if a FRU is identified by any SRCs that are shown (see "How to Display the Error History Table" on page 1-26).

2. Power off the personal computer.

3. Power off the 5364.

4. Unplug the power cords for the personal computer and the 5364.

5. Remove the 5364 cover ("System Cover" on page 3-2).

6. Reseat the cards and cables in the 5364 and the expansion cable from the personal computer to the 5364.

7. Tighten all ground screws.

8. Reconnect the 5364 power cord and power on the 5364.

9. Measure the voltages on the planar test points.

   If the voltages are not correct, see "Planar Board and Card Locations" on page 2-6 and "DC Voltage Distribution" on page 2-9 to isolate the problem.

   *Note: For information on 5364 power requirements, see the appendix in **Setting Up Your Computer—5364**, SA21-9505.*

10. Power off the 5364 and unplug the power cord.

11. Reinstall the 5364 unit cover.

12. Connect the personal computer and 5364 power cords.

13. Power on the 5364, then power on the personal computer.

14. Ensure that the air-flow openings on the 5364 are not obstructed and that the power supply fan and the 5364 logic fan are operating.

15. Perform an IPL from disk or diskette. See "How to Perform an IPL from Disk or Diskette" on page 1-5.

16. Run SYSTEST for 10 minutes (see "How to Run System Test" on page 1-25).

    Analyze any errors that occur during SYSTEST (see "How to Display the Error History Table" on page 1-26) to determine which device is failing.

    Use any SRCs that are displayed to determine which FRU is failing.

    Note: Some SRCs that indicate programming errors may have been caused by hardware failures. Suspect the following FRUs:

    CSP cards
    MSP cards
    Memory card
    Planar board

How to Run System Test

System Test (SYSTEST) is used to verify correct operation of the 5364 system. Use SYSTEST and the error history log (ERAP) to determine which FRU is failing and to verify correct system operation after installing a FRU.

1. Type SYSTEST on the command line and press the Enter key.
2. Select the devices to be tested. Each asterisk (*) indicates an active exerciser.
3. Select system test options to activate specific exercisers.
4. After you have activated the system test exercisers you want, select the option to exit the Device Selection menu.
5. Select a SYSTEST timer option and enter the length of time you want system test to run.
6. If errors are indicated, see "How to Display the Error History Table" on page 1-26 to display the errors. Errors that occur during system test are not in the same error history table as errors that occur during wrap tests and normal customer operation.

To Interrupt SYSTEST

To interrupt system testing, press the Attn key and select option 4 on the Inquiry menu. A SYSTEST print/display menu appears on the system console.

To End SYSTEST

You can end system testing only from the SYSTEST print/display menu. Therefore, if the system test program is running, it must be interrupted.

From the SYSTEST print/display menu, select the option to terminate (end) SYSTEST.

How to Display the Error History Table

The error recording analysis procedure (ERAP) gets, formats, and displays or prints error information.

Use this procedure to display the error history table. Determine if any SRC that is logged occurred only under specific conditions such as a time range or while running a specific program.

Use any information obtained and the SRC tables to isolate the failing FRU.

There are four methods of getting ERAP reports:

- The ERAP procedure under SSP lets you get system summary reports and detailed device reports from the system error log.
- The test request procedure (TESTREQ) under SSP lets you get ERAP reports associated with work stations and communications devices.
- The Test Request function key of any local or remote work station lets you get ERAP reports associated with work stations and communications devices.
- A system test (SYSTEST) option lets you get reports about errors that occurred during SYSTEST.

To Get ERAP Reports under SSP

1. Enter ERAP.
2. Select the type of ERAP report.
3. Select the option to display or print the ERAP report.

To Get ERAP Reports, Using the Test Request Procedure

1. Enter TESTREQ.
2. Select the ERAP option.
3. Select the type of ERAP report.

To Get ERAP Reports, Using the Work Station Test Request Key

This procedure assumes that you have a sign-on display, but have not signed on a work station.

1. Press the Cmd key and Test Request function key (backspace key).
2. Select the ERAP option.
3. Select the type of ERAP report.

To Get ERAP Reports when Running the System Test

1. Press the Attn key.
2. Select option 4 (*Set inquiry condition for program*) from the Inquiry menu.
3. Select the option that starts ERAP.
4. Select the ERAP reports you want.
5. Use the Cmd7 key to return to SYSTEST.

Example Error History Table

ERROR HISTORY TABLE FOR XXXXXXXX

FROM: XX/XX/XX XX:XX:XX TO: XX/XX/XX XX:XX:XX

DATE	TIME	SRC	(Information used to generate SRCs)					
YY/MM/DD	HH:MM:SS		.....HEX.....					
XX/XX/XX	XX:XX:XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
XX/XX/XX	XX:XX:XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
XX/XX/XX	XX:XX:XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
XX/XX/XX	XX:XX:XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Note: When you display ERAP reports for some devices, not all of the information available in the reports is shown. However, the additional information is available when you print or spool the reports (see the procedure "Spool and Display ERAP Reports" on the following page).

To Use ERAP Reports

Analyze any SRCs that are logged in ERAP near the time of the customer-reported problem to determine which device is failing.

Spool and Display ERAP Reports

The local work station attachment and disk error history tables contain additional information that is not displayed. When a printer is busy, or is not available, you can send the ERAP report to the system spool writer. The spooled output can be displayed at a local work station using the following procedures.

To Spool the ERAP Output

1. From the ERAP Main menu, select the option for disk or local work station.
2. Select a disk drive or the local work station attachment.
3. Select the option to print the report.
4. Enter the ID of the printer to receive the output and the additional output option (S) to spool the output.

   Note: The printer ID must be valid, but the printer does not need to be operational.

5. Enter the desired time range.

   Note: If the selected printer is not operational, a message is sent to the system console indicating that the printer and the system are not communicating. If this occurs, use option 3 to respond to the message.

6. End ERAP and return to the Main (help) menu.

To Display the Spooled Output

1. From the Main (help) menu, select the option to perform general system activities.
2. From the SYSSESN menu, select the option to control printing (spool file).
3. On the Spool File Status display (upper half of the display), locate and record the spool ID (SP-ID) number for the procedure (PROC) ERAP.
4. From the SPOOLJOB menu (lower half of the display), select the option to control the spool writer and stop spooling to the selected printer, or select the option to hold entries and enter the spool ID. Return to the SPOOLJOB menu.
5. From the SPOOLJOB menu, select the option to copy or display entries.
6. On the COPYPRT procedure prompt, enter the spool ID (first item) and CRT (last item).

   Note: You can also copy the ERAP data to a named file, and you can cancel or release the spool entry in the same operation.

7. On the display that shows the error history table, type 70 in the DISP START POS field and press the Enter key. You are now displaying the last 62 positions of the spooled output. Use the Roll keys to view entries in the table.
8. Use the Cmd7 key to return through the prompts and menus. Restart the spool writer, or release or cancel entries as you return.

Section 2. How to Locate and Identify Field-Replaceable Units

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FRU Locations 2-4
Planar Board and Card Locations 2-6
  Planar Board Voltage 2-7
Power Supply Connector Locations 2-8
DC Voltage Distribution 2-9
System Logic Diagram 2-10
Top Card Connectors 2-11

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Locations Overview

The 5364 System Unit is attached to a personal computer with an expansion unit interface cable. The personal computer is used as the system console. The locations section contains the following:

- FRU Locations

  These pages show the locations of the FRUs in the 5364 unit.

- Planar Board and Card Locations

  These pages show:

  Connector locations on the planar board

  Card plug locations on the planar board

  Block diagram of the 5364 System Unit

- Power Supply Connector Locations

  This page shows the locations and pin numbering of the power supply connectors.

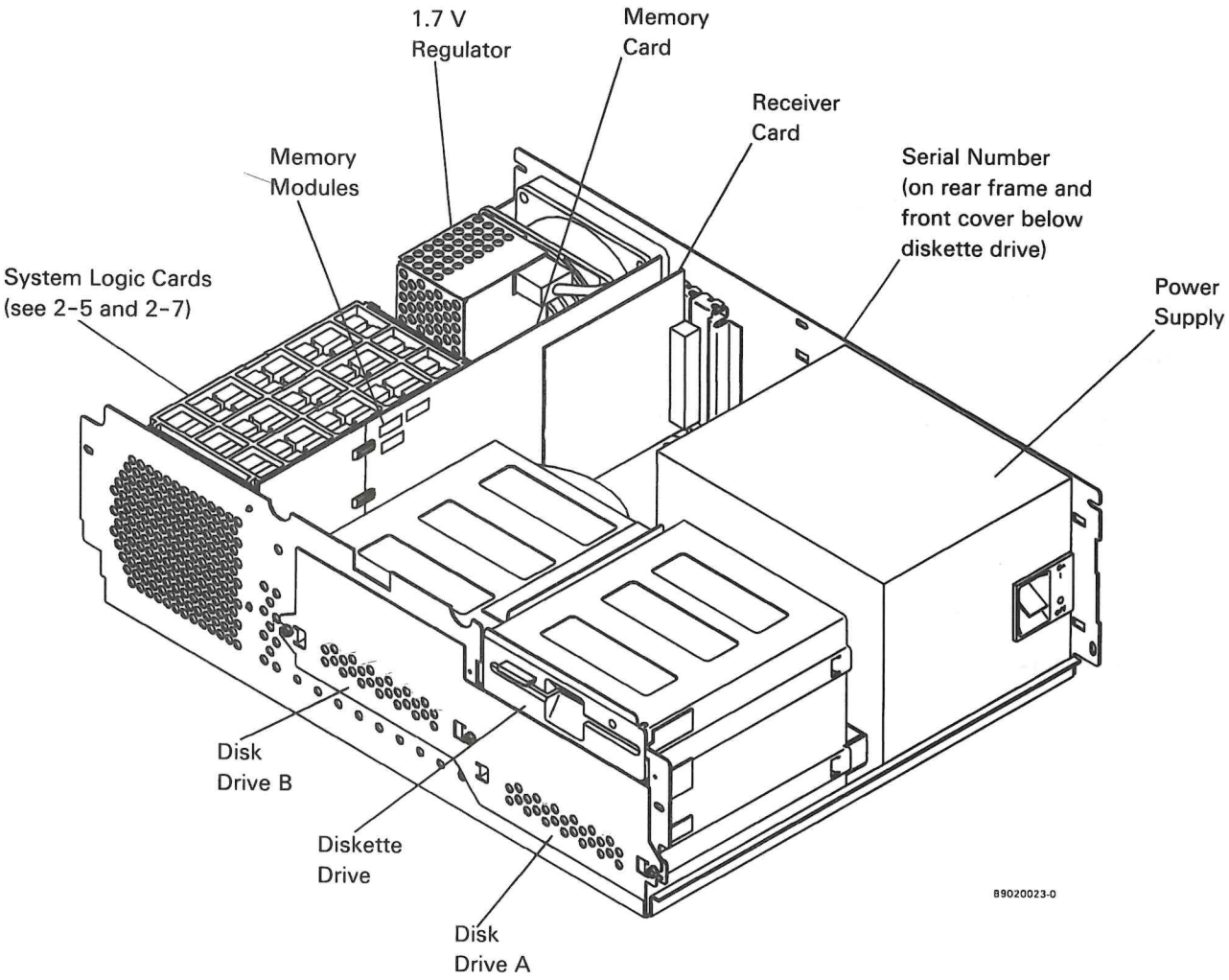
- DC Voltage Distribution

  This page shows the voltage levels on the power supply connector pins.

- Top Card Connectors

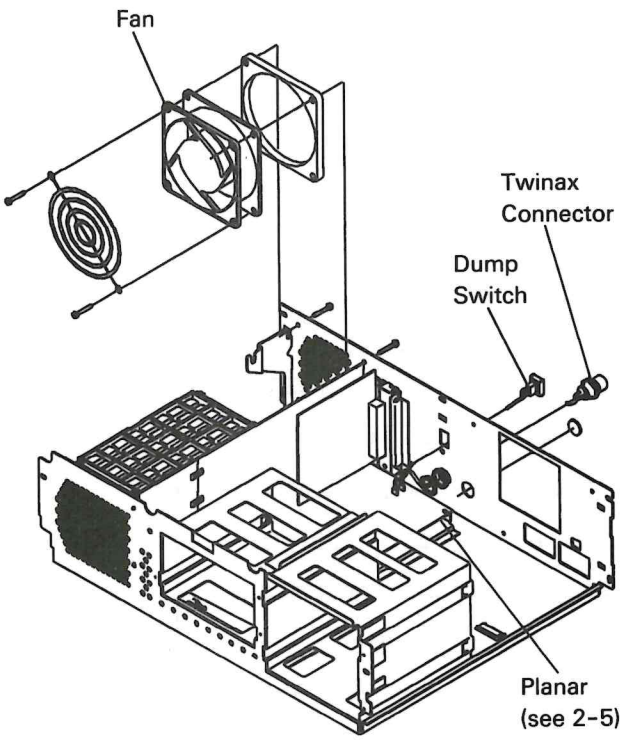
  This page shows the top card connectors on the system logic cards.

FRU Locations



Reference

"System Cover" on page 3-2
"Power Supply" on page 3-3
"Disk Drive" on page 3-10
"Diskette Drive" on page 3-12
"1.7 Volt Regulator" on page 3-4
"Memory Card Module Removal (256K Card Only)" on page 3-13



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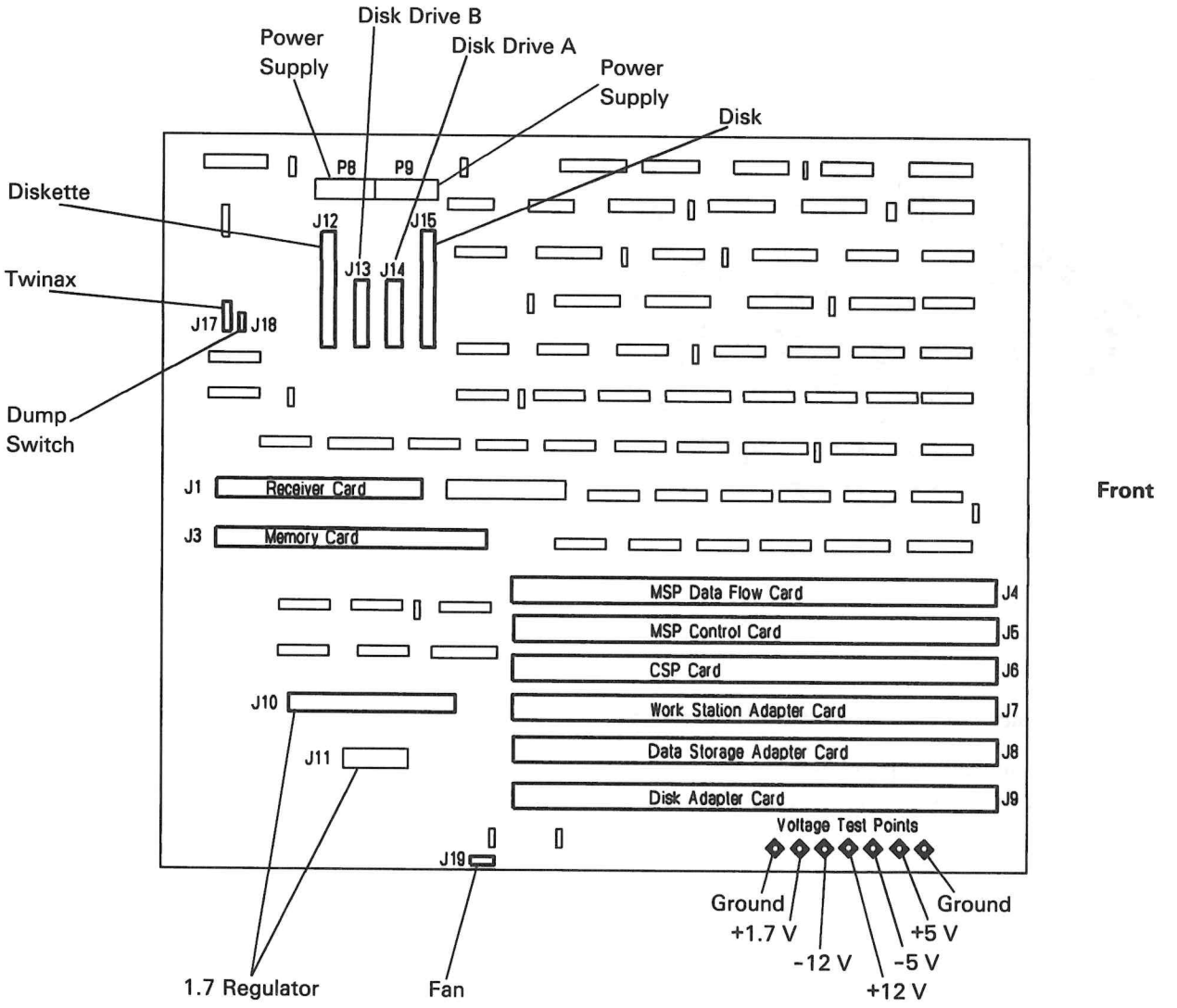
Reference

"Fan Removal" on page 3-5
"Planar Board Removal" on page 3-6

Planar Board and Card Locations

Use the figure below to locate planar connectors associated with a FRU or an SRC.

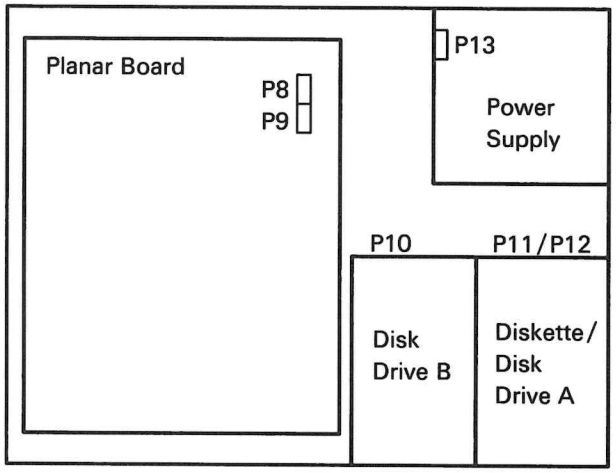


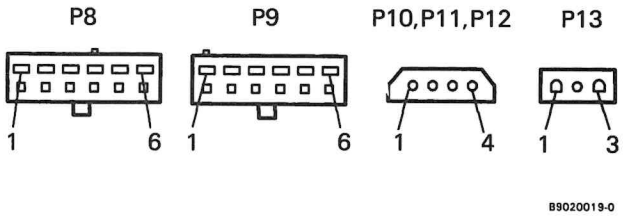
Planar Board Voltage

The voltages can be measured at the planar test points using a digital voltmeter with 3.5 digit precision.

Test Point	High	Low
+1.7 volts See note.	+1.785	+1.615
+5 volts	+5.25	+4.80
-5 volts	-5.50	-4.60
+12 volts	+12.60	+11.52
-12 volts	-13.20	-10.92
Note: *+1.7 volts is not present at the planar test point until the S36 program is loaded in the personal computer.*		

Power Supply Connector Locations





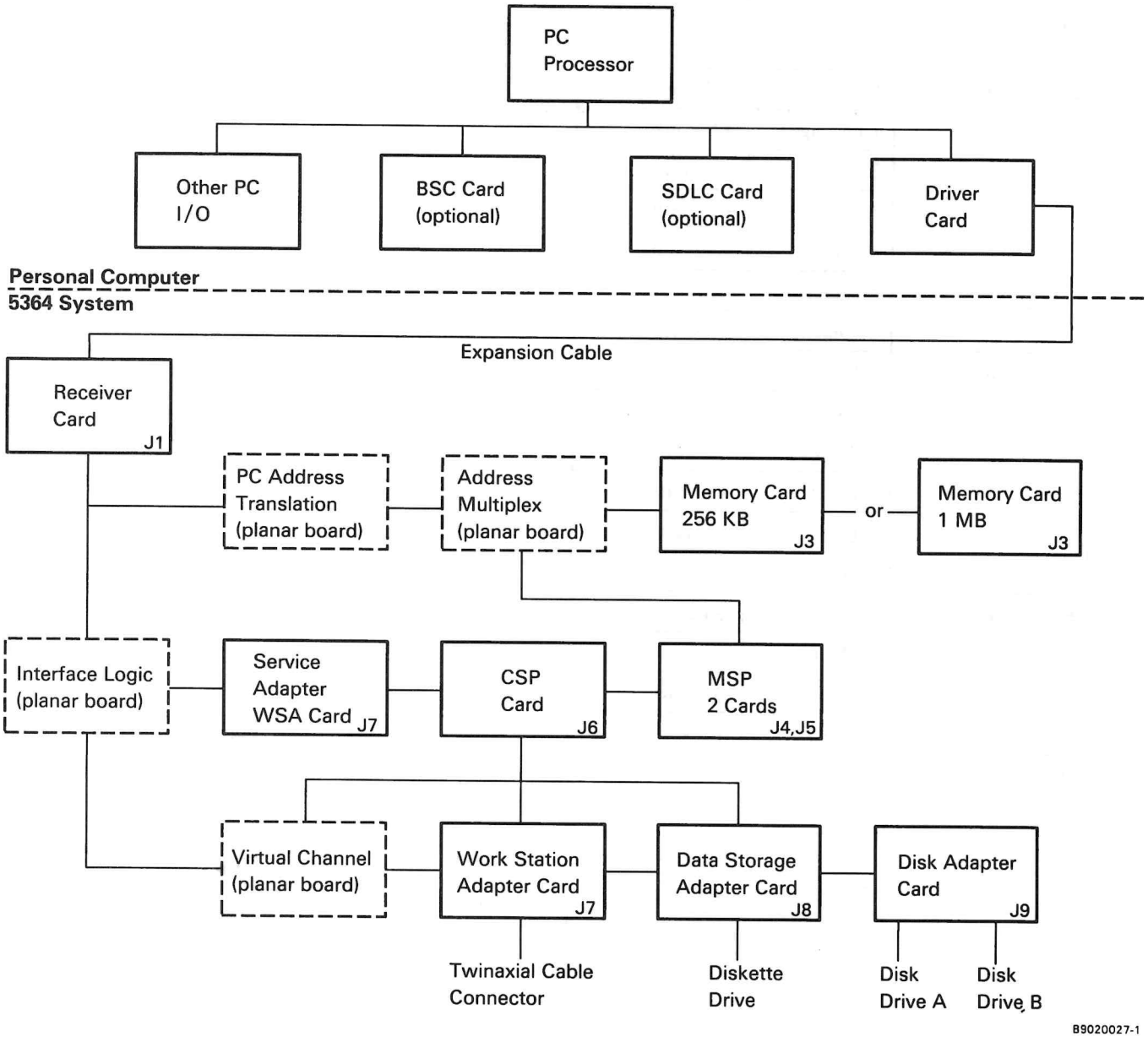
DC Voltage Distribution

See "Planar Board Voltage" on page 2-7 to measure voltages. For test point location, see "Planar Board and Card Locations" on page 2-6 and "Power Supply Connector Locations" on page 2-8.

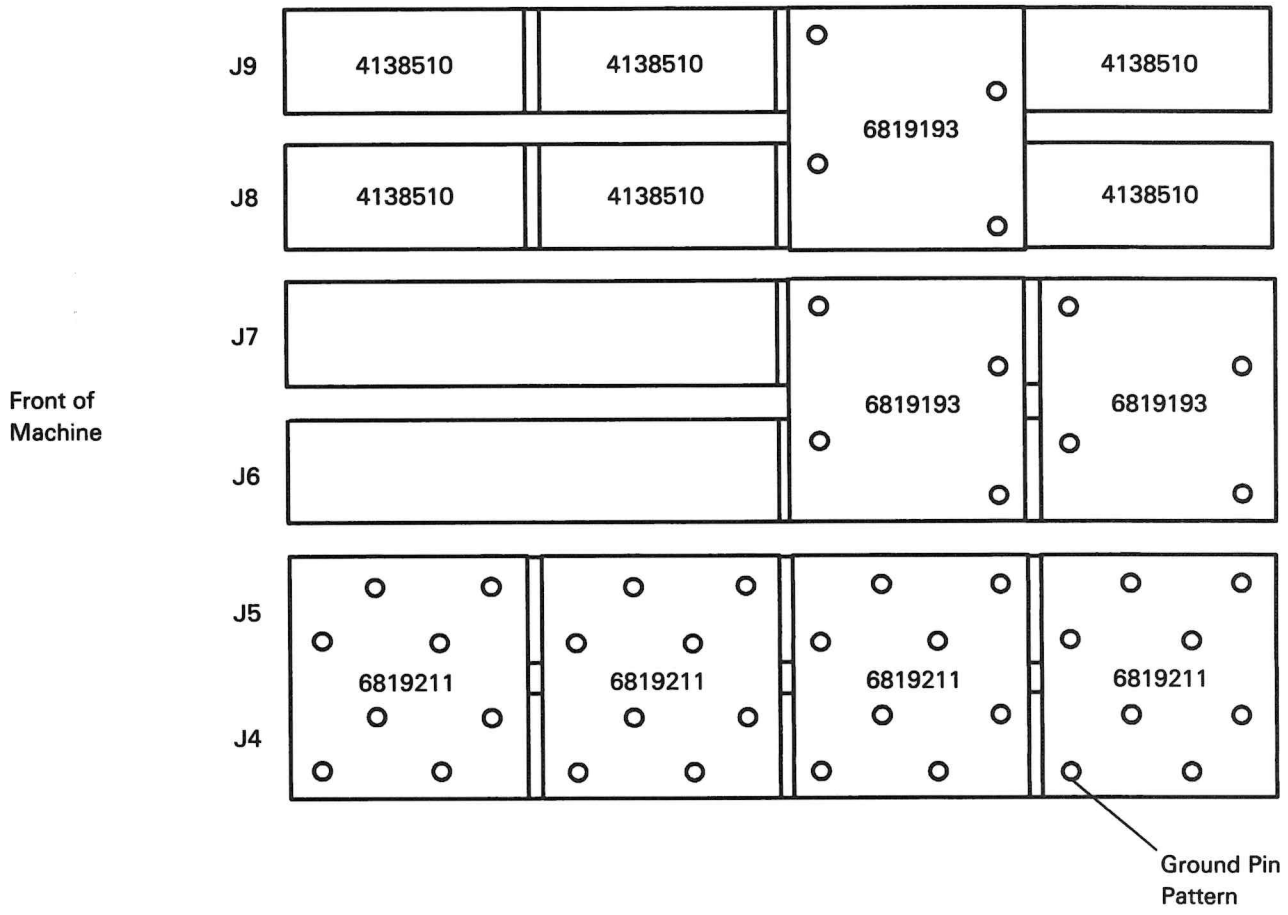
Connector	Pin	Voltage
P8 (planar)	1 (orange)	+5 volts
	2 (red)	+5 volts
	3 (yellow)	+12 volts
	4 (blue)	−12 volts
	5 (black)	Ground
	6 (black)	Ground
P9 (planar)	1 (black)	Ground
	2 (black)	Ground
	3 (white)	−5 volts
	4 (red)	+5 volts
	5 (red)	+5 volts
	6 (red)	+5 volts
P10 (disk B)	1 (yellow)	+12 volts
	2 (black)	Ground
	3 (black)	Ground
	4 (red)	+5 volts
P11 (diskette)	1 (yellow)	+12 volts
	2 (black)	Ground
	3 (black)	Ground
	4 (red)	+5 volts
P12 (disk A)	1 (yellow)	+12 volts
	2 (black)	Ground
	3 (black)	Ground
	4 (red)	+5 volts
P13 (1.7 V regulator)	1	Primary common
	2	Ground
	3	+375 volts

System Logic Diagram

The block diagram on this page shows how the 5364 unit logic interfaces with the personal computer.



Top Card Connectors



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Section 3. Removals and Replacements

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Memory Card Module Removal (256K Card Only) 3-13
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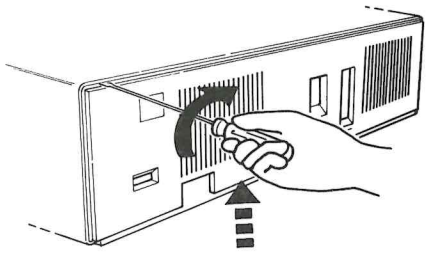
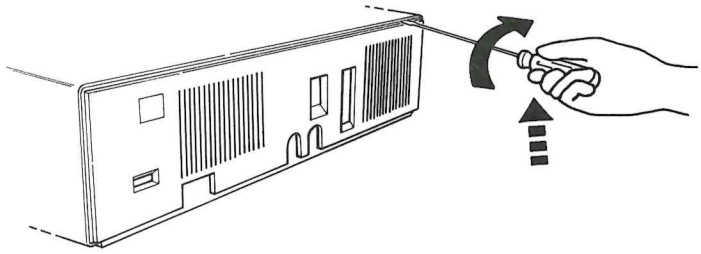
System Cover

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Disconnect the personal computer expansion cable and the work station cable (if installed).
5. Remove the rear panel cover on the 5364 by doing the following steps. The cover has tabs that hold it in place on the frame.

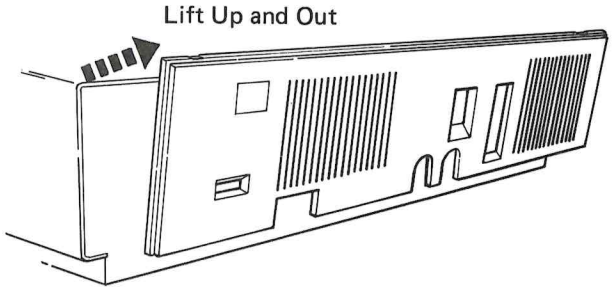
   a.



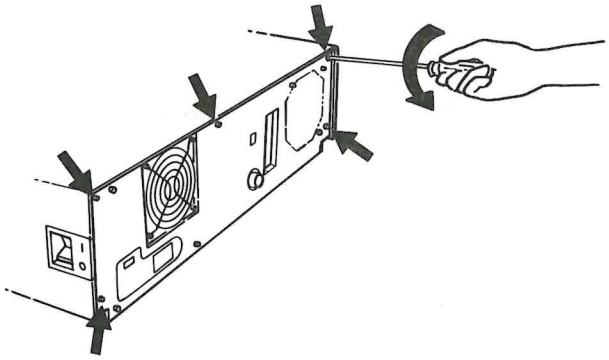
   b.



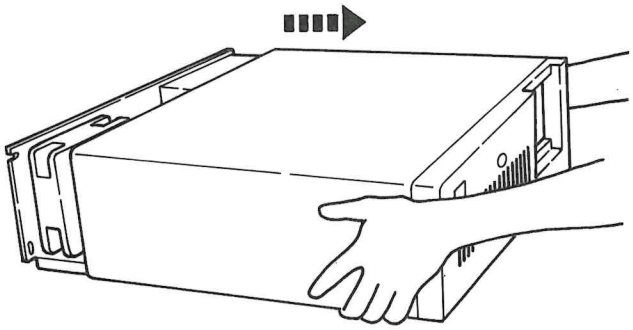
   c.



6. Use a flat-blade screwdriver or 1/4 inch nutdriver and remove the five mounting screws by turning them counterclockwise.



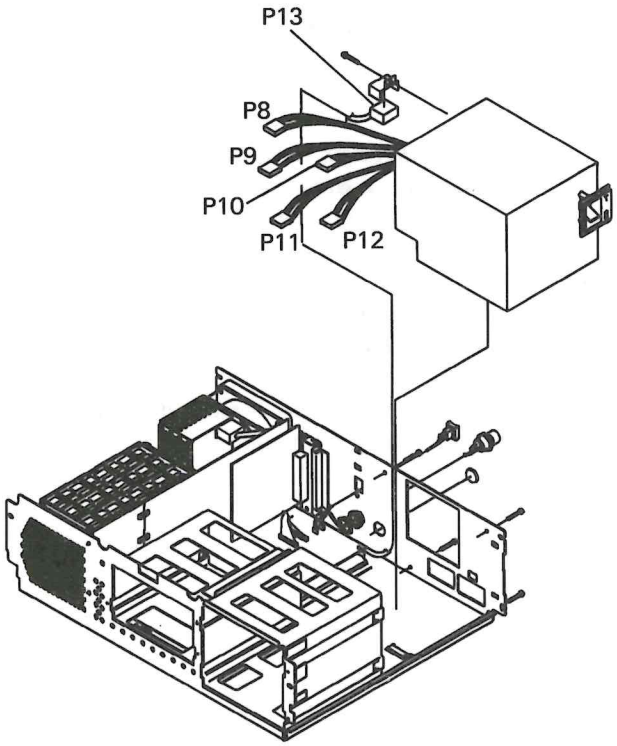
7. Remove the 5364 System Unit cover by sliding it from the rear to the front. It may be necessary to tilt the cover up to remove it from the base.



8. Install the cover by doing the above steps in reverse order.

Power Supply

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Remove the 5364 cover (see "System Cover" on page 3-2).
5. Disconnect the power supply connectors to the planar board (P8 and P9), the disk drives (P10 and P12), and to the diskette drive (P11).



6. Disconnect the 1.7 volt regulator cable connector (P13) from the left side of the power supply. Loosen the screw and remove the shield to unplug the connector.
7. Remove the four screws from the rear of the 5364 that hold the power supply.
8. Slide the power supply toward the front of the 5364 to clear the tabs on the frame and lift upward to remove.

   Note: When installing a new power supply, ensure that the 100/200 V switch on the rear of the power supply is set to the correct position for the input voltage and that the Power switch is set to Off.

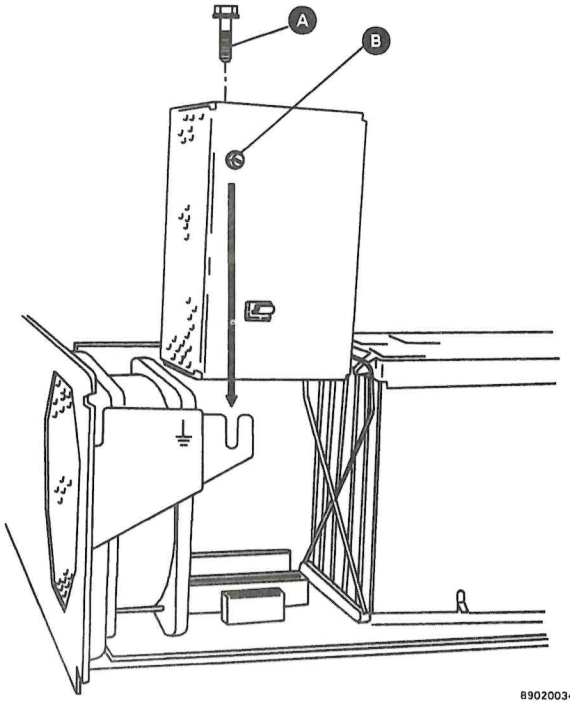
9. Install the new power supply by performing the above steps in reverse order. Ensure that you slide the power supply under the tabs on the 5364 frame.

1.7 Volt Regulator

This procedure removes logic cards that are sensitive to electrostatic discharge. See Appendix B, "Working with ESD-Sensitive Cards" on page B-1 before performing this procedure.

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Remove the fan cable from the clamp on the side of the regulator.
5. Remove the 5364 cover (see "System Cover" on page 3-2).
6. Remove the memory card (J3) and the receiver card (J1).

   Note: To remove the regulator without removing the memory card and the receiver card, disconnect the power connector from the regulator instead of the power supply. Remove screw (A) and the connector shield to unplug the connector.



89020034-0

7. Disconnect the 1.7 regulator cable connector (P13) from the left side of the power supply. Remove the connector shield and screw to unplug the connector.
8. Loosen screw (B) that holds the regulator to the frame.

   Note: Ensure that this screw is tight after reinstalling the regulator. This is the AC safety ground screw between the regulator and the frame.

9. Unplug the regulator assembly from the planar board.
10. Install the regulator by performing the above steps in reverse order.

    Notes:

    a. Ensure that both cards in the regulator assembly are seated correctly when you plug the assembly in the planar board (J10 and J11).

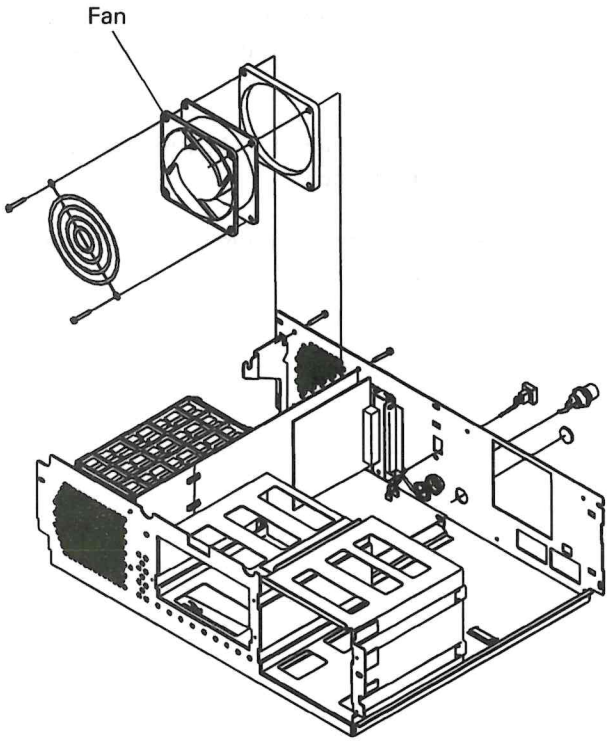
    b. Ensure that the cable to the power supply is under the memory and receiver cards.

    c. Ensure the fan cable is secured in the clamp on the side of the regulator.

Fan Removal

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Remove the 5364 cover (see "System Cover" on page 3-2).
5. Loosen the screw that holds the 1.7 volt regulator to the frame (see "1.7 Volt Regulator" on page 3-4).

   Note: Ensure that this screw is tight after reinstalling the regulator. This is the AC safety ground screw between the regulator and the frame.



B9020022-0

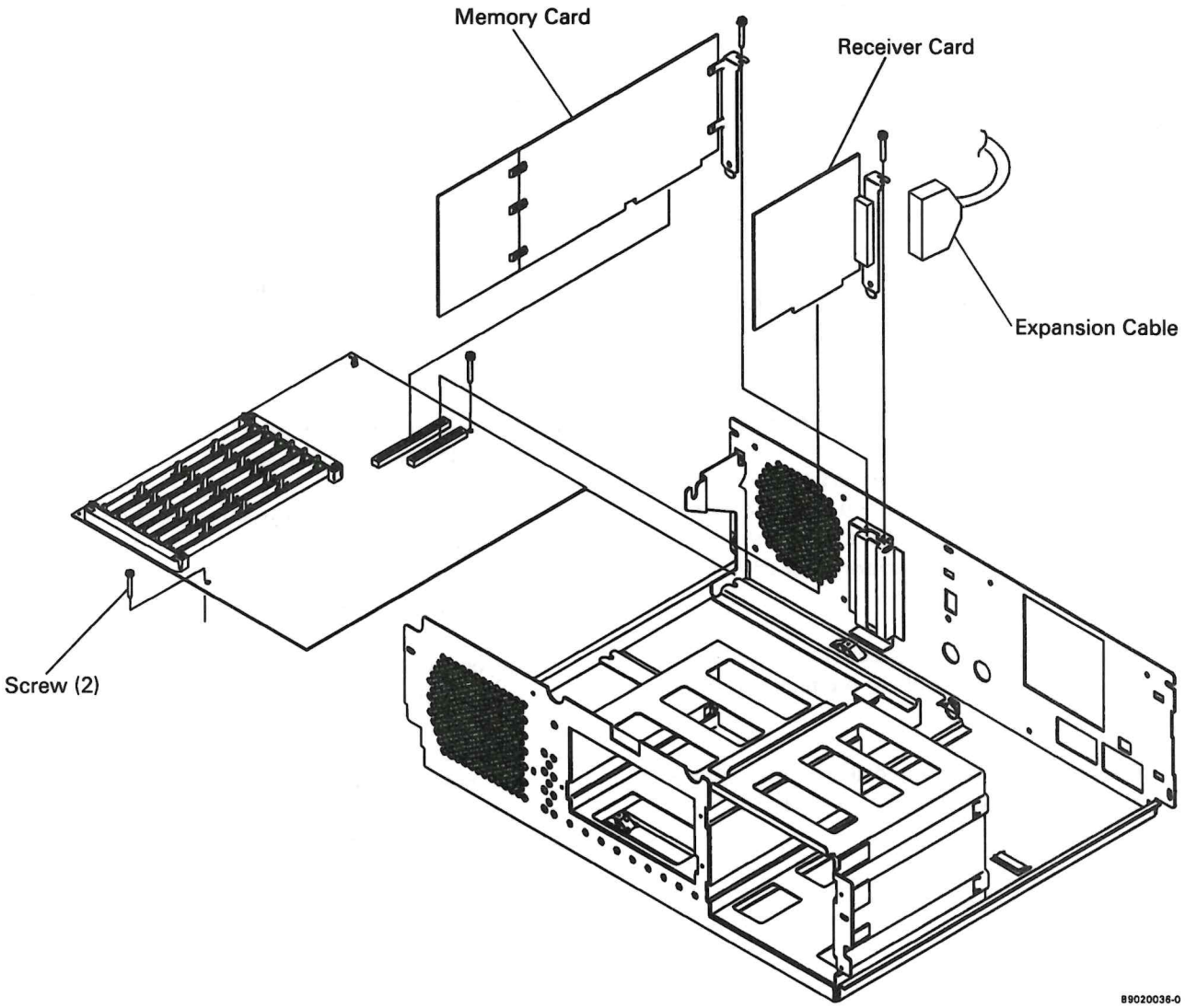
6. Unplug the regulator from the planar board and set it out of the way.
7. Disconnect the fan power cable (J19) from the planar board.
8. Remove the four screws that hold the fan.
9. Remove the fan and the spacer.
10. Install the fan by performing the above steps in reverse order. Ensure that the spacer is installed between the fan and the frame.

Planar Board Removal

This procedure removes logic cards that are sensitive to electrostatic discharge. See Appendix B, "Working with ESD-Sensitive Cards" on page B-1 before performing this procedure.

When removing the planar board, leave the system logic cards plugged into the board. After the new planar board is installed, transfer the system logic cards to the new planar board one at a time.

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Disconnect the personal computer expansion cable from the 5364.
5. Remove the 5364 cover (see "System Cover" on page 3-2).
6. Remove the 1.7 volt regulator assembly (see "1.7 Volt Regulator" on page 3-4).
7. Remove the memory card (J3) and the receiver card (J1).
8. Disconnect the power supply connectors P8 and P9 from the planar board.
9. Disconnect the twinaxial connector (J17), the dumpswitch connector (J18), and the fan connector (J19) from the planar board.
10. Disconnect the disk and diskette cables from the planar board (J12, J13, J14, and J15).
11. Remove the fan and spacer (four screws).
12. Remove the two screws holding the planar to the frame.
13. Remove the planar board and system logic cards as an assembly:
    a. Slide the planar toward the left side of the frame so that the standoffs attached to the bottom of the planar board clear the slots in the frame.
    b. Lift the planar board slightly to clear the left side of the frame.
    c. Slide the planar board out of the left side of the 5364.


Memory Card
Receiver Card
Expansion Cable
Screw (2)
B9020036-0

Planar Board Replacement

This procedure installs logic cards that are sensitive to electrostatic discharge. See Appendix B, "Working with ESD-Sensitive Cards" on page B-1 before performing this procedure.

1. Carefully slide the new planar board into the unit from the side.

2. Reinstall the two screws that hold the planar board to the frame.

3. Move the system logic cards from the old planar board to the new planar board, one at a time.

   Note: The top card connectors on the system logic cards are not all the same part number. See "Top Card Connectors" on page 2-11 for information on location and part numbers.

4. Reinstall the fan and spacer (four screws) and reconnect the fan cable to the planar board (J19).

5. Reconnect the disk and diskette drive cables to the planar board (J12, J13, J14, and J15).

6. Reconnect the twinaxial connector cable (J17) and the dumpswitch cable (J18) to the planar board.

7. Reinstall the 1.7 volt regulator.

   Notes:

   a. *Ensure that both cards in the regulator assembly are seated correctly when you plug the regulator in the planar board.*

   b. *Ensure that the AC safety ground screw that holds the regulator to the frame is tight.*

8. Reinstall the memory card (J3) and the receiver card (J1) in the planar board.

9. Reconnect the power supply connectors (P8 and P9) to the planar board.

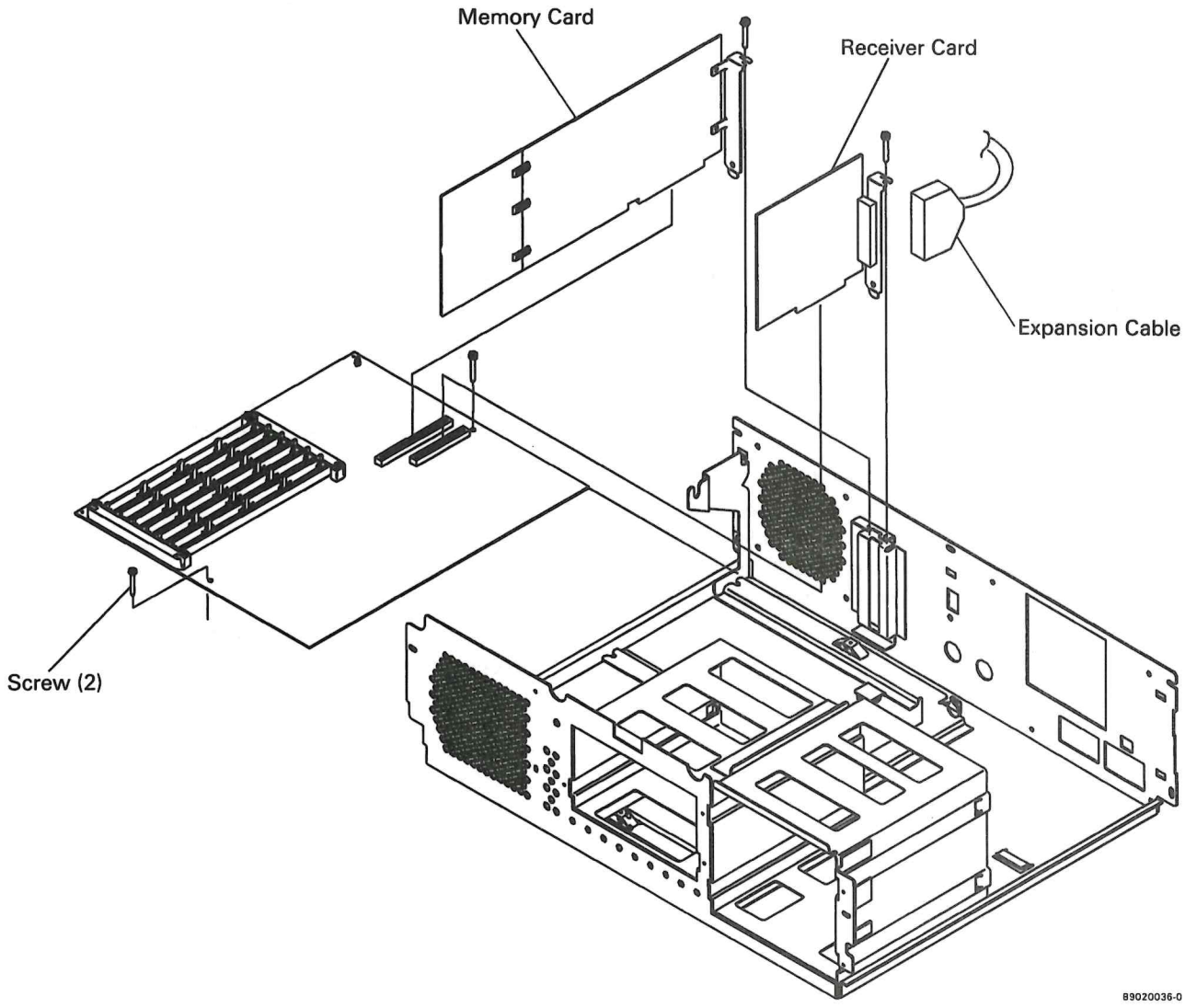
10. Reinstall the 5364 cover.

11. Reconnect the personal computer expansion cable to the 5364.

12. Reconnect the power cords for the personal computer and the 5364.

13. Verify correct operation of the 5364 by performing an IPL (see "How to Perform an IPL from Disk or Diskette" on page 1-5) and running system test (see "How to Run System Test" on page 1-25).

Note: New planar boards are shipped with a backup service password of MASTER and a service password of PASSWORD. Ensure the customer knows the passwords must be changed to maintain the security of the system.


Memory Card
Receiver Card
Expansion Cable
Screw (2)
89020036-0

Disk Drive

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Remove the 5364 cover (see "System Cover" on page 3-2).
5. Remove the deflector bracket (two screws) and the plate (one screw) on the front of the 5364 frame.

   Note: If you are removing the disk drive below the diskette drive, loosen the two clips that hold the diskette drive in position. Then slide the diskette drive slightly forward to permit access to the disk drive cables.

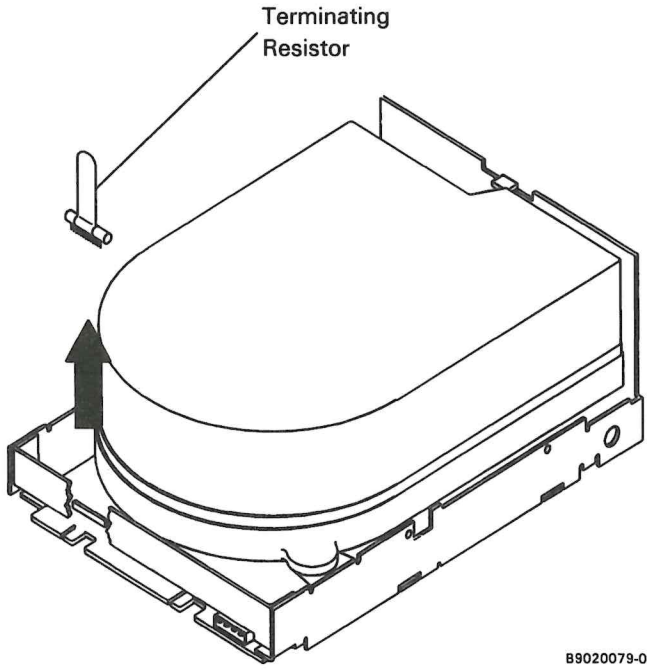
6. Slide the disk drive slightly toward the front of the 5364.
7. Disconnect the cables from the rear of the disk drive (one power cable and two signal cables).
8. Slide the disk drive out of the 5364.

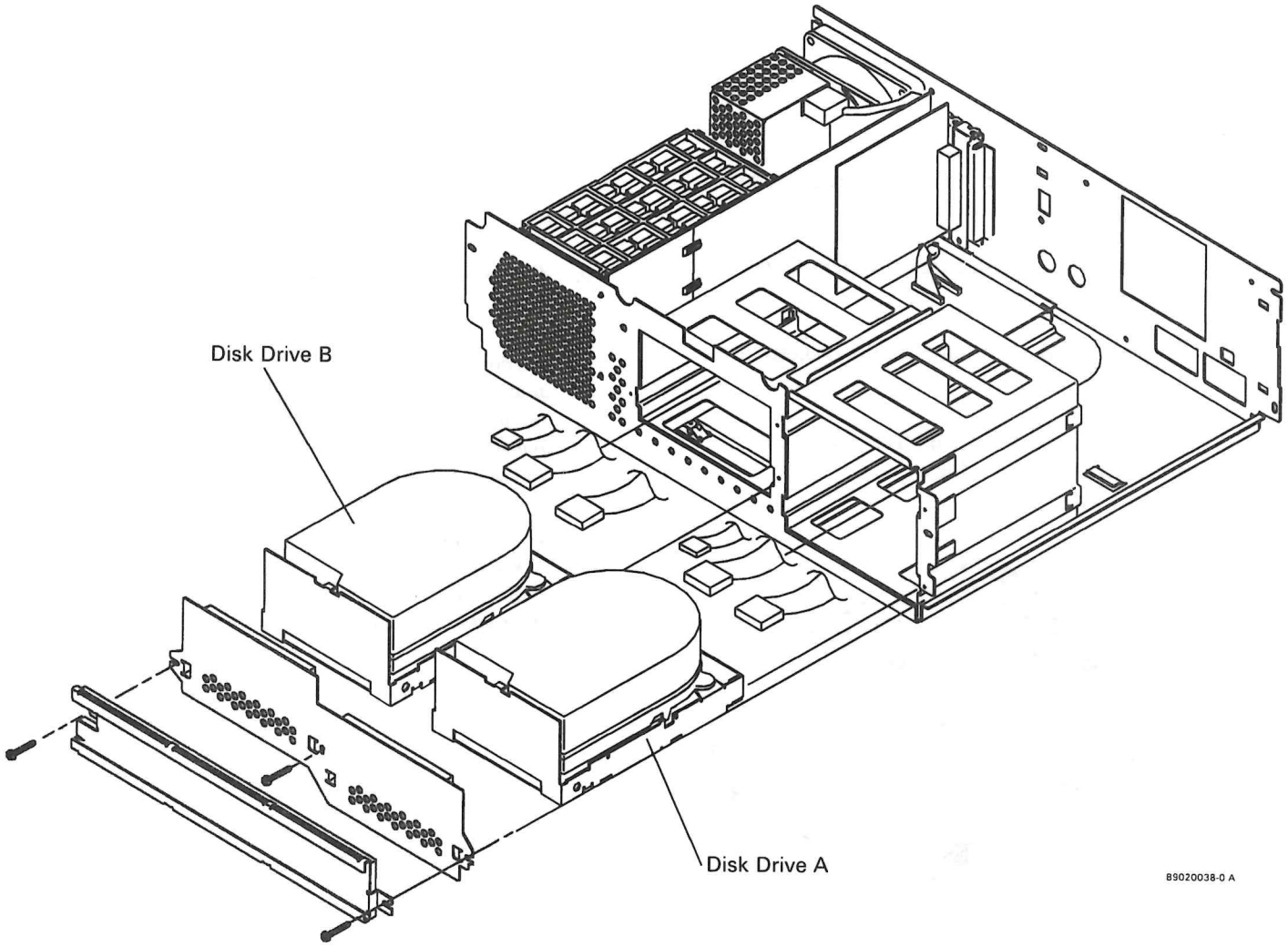
   Notes:

   a. *Before you install a new disk drive, record the defect information printed on the label attached to the disk drive. The disk initialization program prompts you for this information if an alternative sector assignment table is not present on the disk drive.*

   b. *Before you install a new disk drive B, remove the terminating resistor from the rear of the disk drive.*

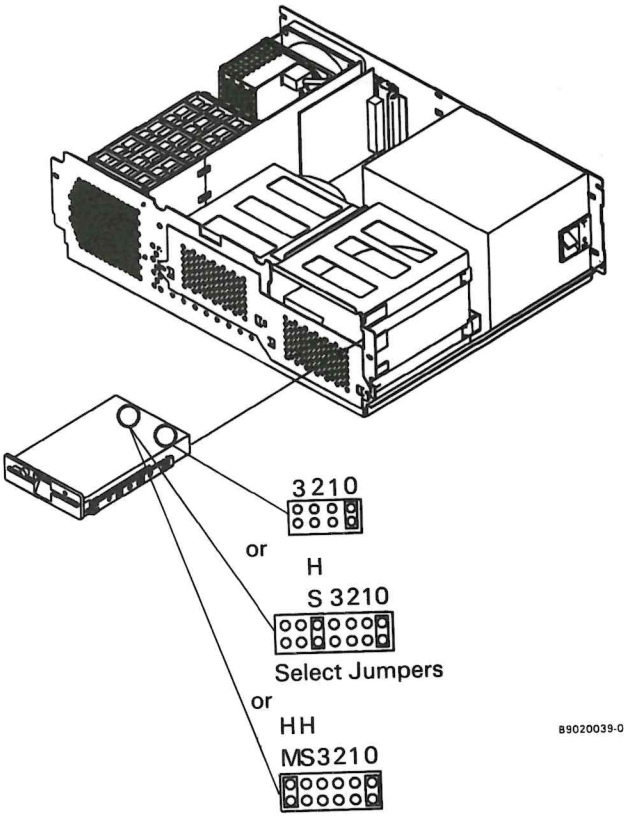
9. Install the disk drive by doing the above steps in reverse order.
10. If you installed a new disk drive, go to "Initializing a Disk Drive" on page 4-5 to initialize the disk drive.




Disk Drive B
Disk Drive A
89020038-0 A

Diskette Drive

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Remove the 5364 cover (see "System Cover" on page 3-2).
5. Loosen the two clips that hold the diskette drive in position.
6. Slide the diskette drive slightly forward to permit access to the cables.



7. Disconnect the power cable and the signal cable from the diskette drive.
8. Slide the diskette drive out of the 5364.
9. Install the diskette drive by doing the above steps in reverse order.

   Notes:

   a. *Ensure that the select jumper is connected to select drive 0.*

   b. *Remove the grounding rails (left and right side) from the old diskette drive and install them on the new diskette drive. The rail for the left side is marked with an L and the rail for the right side is marked with an R.*

   c. *If the signal cable connector location on the new diskette drive is in a different location than on the old diskette drive, see the instructions packaged with the drive.*

Memory Card Module Removal (256K Card Only)

Before using this procedure, see Appendix B, "Working with ESD-Sensitive Cards" on page B-1.

This procedure is used to exchange failing modules on the memory card. The location of the failing module is displayed on the personal computer when the memory card diagnostics are run. Record the failing module number before starting this procedure.

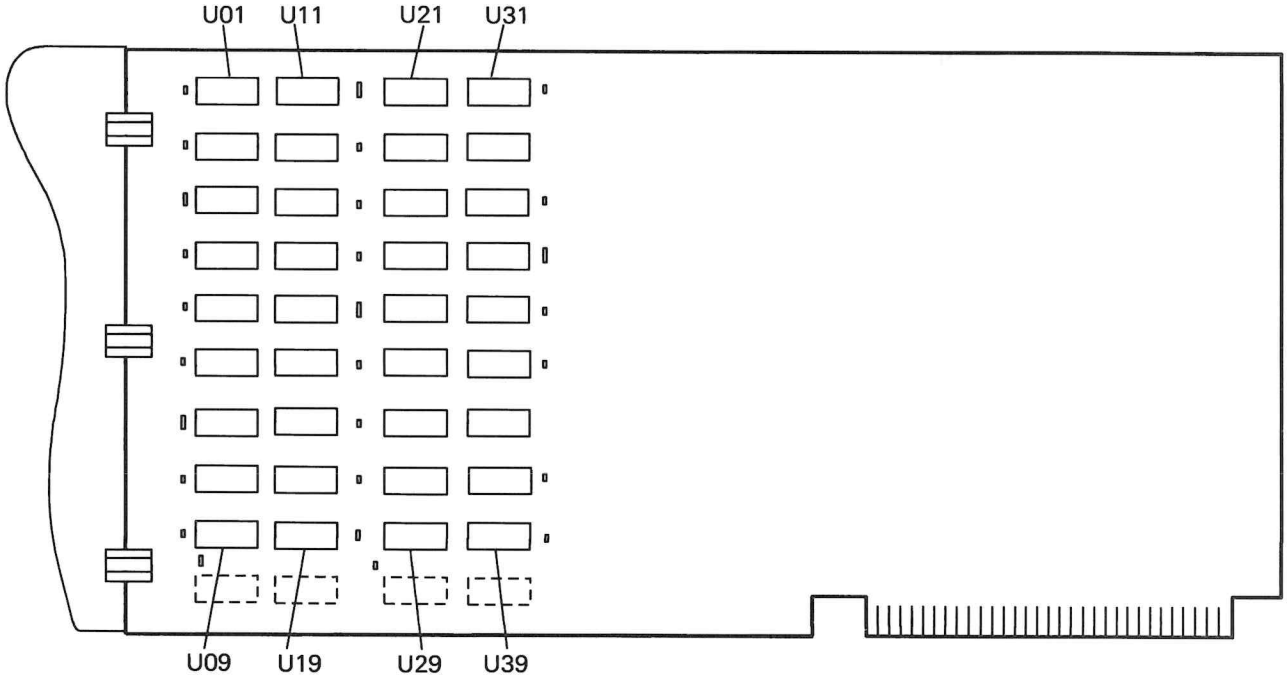
1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Remove the 5364 cover (see "System Cover" on page 3-2).
5. Remove the memory card (J3).
6. Place the card on a flat surface with the modules facing up and the card connector toward you.
7. Locate the failing module (Uxx) identified by the diagnostics. The module location is printed on the memory card.
8. Remove the failing module with a module puller (IBM part 9900764) by carefully lifting upward.

Warning: The pins on the module are easily bent and must be aligned with the connector before the module is pressed in place.

9. Align the pins of the new module with the connector and press the module in place.

   Note: The notch on the module should face the left side of the card. You can verify the notch location by looking at the other modules on the card. The notches on all of the modules should be facing the same direction.

10. Plug the memory card back into the planar board (J3).
11. Put the 5364 cover back on.
12. Reconnect the personal computer and 5364 power cords.
13. Verify correct operation by running the memory card diagnostics. See "Memory Card Failures (256K Card Only)" on page 1-23.



Memory Card Removal

Before using this procedure, see
Appendix B, "Working with ESD-Sensitive Cards" on page B-1.

This procedure is used to exchange a failing memory card:

1. Power off the personal computer.
2. Power off the 5364.
3. Disconnect the power cord from the personal computer and the 5364.
4. Remove the 5364 cover (see "System Cover" on page 3-2).
5. Remove the memory card (J3).
6. Determine the correct replacement by matching the part number of the failing card with the replacement card.
7. Plug the new memory card back into the planar board (J3).
8. Put the 5364 cover back on.
9. Reconnect the personal computer and 5364 power cords.
10. Verify correct operation by running system test for 10 minutes to see if an SRC is generated (see "How to Run System Test" on page 1-25).

Section 4. Service Procedures

Changing the Service Level 4-2
To Change the Service Level—System Running 4-2
To Change the Service Level—System not Running 4-2
How to Reload the System Microcode 4-4
Initializing a Disk Drive 4-5
Modifier Codes for Service Control Menu Options 4-6
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Summary of Useful SSP Procedures 4-8
Preventative Maintenance 4-10

Changing the Service Level

You must know the customer assigned password to change the service level. There are three levels of service:

Normal: This is the normal system operating level. The IPL Sign On prompt is displayed when SSP is loaded.

Service: The service level is used when it is necessary to perform service functions and reload the SSP.

Locked: If the security level is changed to Locked after an IPL, the system continues to operate the same as in the normal level with the following exception. The Service Control menu functions are not valid, except the option to display the Service Level menu.

To Change the Service Level—System Running

1. Hold down the ALT key and press the ESC key. Repeat this step until the Session Selection menu is displayed.
2. Select the option for a service session (the Service Control menu is displayed).
3. Select the option to change the service level (the Service Level menu is displayed).
4. Select the option to change the service level.
5. Enter the customers service password and select the number for the level you want (normal, service, or locked).
6. The Service Control menu is displayed. If you want to display the System/36 Main menu, continue with the following steps.
7. Hold the ALT key and press the ESC key.
8. Select the option for work station operations.

To Change the Service Level—System not Running

1. Load the DOS program into the personal computer.

   For personal computers without a disk drive:

   - Insert the DOS program diskette into diskette drive A of the personal computer.
   - Hold down the CTRL and ALT keys and press the DEL key.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (A>) is displayed.

   For personal computers with a disk drive:

   - DOS is loaded automatically when the personal computer is powered on, if no diskette is in personal computer diskette drive A.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (C>) is displayed.

2. Load the S36 program into the personal computer:

   Note: If a batch file is set up, the S36 program is loaded automatically.

   For personal computers with the S36 program on the personal computer disk:

   - Type S36 and press the Enter key.

For personal computers without a disk drive:

- Insert the diskette labeled PC DSKT 01 in personal computer diskette drive A.

  Note: If the 5364 is configured for graphics, you must use the ***original*** *diskette labeled PC DSKT 01.*

- Type S36 and press the Enter key.

  Note: If the DOS prompt is not A>, type A: and press the Enter key. The prompt will change to A>. This makes diskette drive A the default drive.

3. If the service level is set to Locked, the Service Control menu is displayed. To perform an IPL, you must change the service level to service or normal.

   If the service level is set to normal, follow the instructions for changing the service level—system running.

   Note: If you change the service level to normal, you must reload the S36 program in the personal computer to perform an IPL.

How to Reload the System Microcode

*Note: See **Operating Your Computer—5364** for information on how to reload the SSP diskettes to the 5364 System Unit.*

This procedure displays the present configuration data (Verify the System), lets you change the configuration data (Configure), and then writes the configuration data to the disk (Customize).

1. Power on the 5364.
2. Power on the personal computer.
3. Load the DOS program into the personal computer:

   For personal computers without a disk drive:

   - Insert the DOS program diskette into diskette drive A of the personal computer.
   - Hold down the CTRL and ALT keys and press the DEL key.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (A>) is displayed.
   - Go to step 4.

   For personal computers with a disk drive:

   - DOS is loaded automatically when the personal computer is powered on.
   - Enter the date and time if prompted.
   - DOS is loaded in the personal computer when the DOS prompt (C>) is displayed.

4. Load the S36 program into the personal computer:

   Note: If a batch file is set up, the S36 program is loaded automatically.

   For personal computers with the S36 program on the personal computer disk:

   - Type S36 and press the Enter key.

   For personal computers without the S36 program on the personal computer disk:

   - Insert the diskette labeled PC DSKT 01 in personal computer diskette drive A.

     *Note: If the 5364 is configured for graphics, you must use the **original** diskette labeled PC DSKT 01.*

   - Type S36 and press the Enter key.

     Note: If the DOS prompt is not A>, type A: and press the Enter key. The prompt will change to A>. This makes diskette drive A the default drive.

5. If an SRC appears on the display, or if the Service Control menu is displayed with an SRC, use the SRC to isolate the failing FRU.
6. If the Sign On display is displayed or the service level is locked or normal, change the service level to service. See "Changing the Service Level" on page 4-2.

   Note: If the service level is changed you must reload the S36 program in the personal computer and perform an IPL.

7. Insert the diskette labeled MCODE DSKT 11 in the 5364 diskette drive.
8. Select the option to Configure, Customize, or Verify the System.
9. Press the Enter key.
10. Follow the prompts to load the microcode.

Initializing a Disk Drive

This procedure is used to initialize new disk drives after they are installed in the 5364.

1. Power on the 5364.
2. Power on the personal computer.
3. Load the DOS program into the personal computer:

   For personal computers without a disk drive:

   - Insert the DOS program diskette into diskette drive A of the personal computer.
   - Hold down the CTRL and ALT keys and press the DEL key.
   - Enter the date and time when prompted.

   For personal computers with a disk drive:

   - DOS is loaded automatically when the personal computer is powered on.
   - Enter the date and time when prompted.

4. Load the S36 program into the personal computer:

   Note: If a batch file is set up, the S36 program is loaded automatically.

   For personal computers with the S36 program on the personal computer disk:

   - Type S36 and press the Enter key.

   For personal computers without a disk drive:

   - Insert the diskette labeled PC DSKT 01 in personal computer diskette drive A.
   - Type S36 and press the Enter key.

     Note: If the DOS prompt is not A>, type A: and press the Enter key. The prompt will change to A>. This makes diskette drive A the default drive.

5. If the Sign On display is shown or the service level is locked, change the service level to service. See "Changing the Service Level" on page 4-2.
6. Select the option to display or alter the modifier code.
7. Enter a modifier code of 22FF.
8. Insert the diskette labeled MCODE DSKT 11 in the 5364 diskette drive.
9. Select the option to initialize the new disk.
10. Follow the prompts.

    If an alternative sector assignment table is not present on the disk drive, you are prompted to enter the manufacturing defect information from the label attached to the disk drive. You must press the Enter key after you enter each line of defect information.

    Reload the S36 program in the personal computer and perform an IPL.

11. Select the option to display or alter the modifier code.
12. Enter a modifier code of 1000.
13. Select the option to Configure, Customize, or Verify the System.
14. Press the Enter key.
15. Follow the prompts to load the system microcode.
16. See Chapter 10 in *Operating Your Computer—5364* to load the SSP diskettes to disk drive A.
17. Run system test for 10 minutes to verify correct operation of the system. See "How to Run System Test" on page 1-25 and "How to Display the Error History Table" on page 1-26.

Modifier Codes for Service Control Menu Options

Option	Mod Code	IPL Time (Min)	Description
IPL from Disk	0000	2-4	IPL from disk, run wraps
	FF00	1-2	IPL from disk, bypass wraps
Reload SSP and Microcode	0000	2-4	Load main storage SSP from diskette and reload SSP diskettes to disk, run wraps
	FF00	2-4	Load main storage SSP from diskette and reload SSP diskettes to disk, bypass wraps
Configure, Customize, or Verify the System	0000	2-4	Load DCP from diskette, run wraps
	1000	2-4	Configure and customize, run wraps
	10FF	2-4	Configure and customize, bypass wraps
	FF00	1-2	Load DCP from diskette, bypass wraps
	FFF0	1-2	Load DCP from diskette, bypass channel wraps
Initialize the Disk	0000	2-4	Load DCP from diskette, run channel wraps
	2222	2-4	Initialize the disk, run wraps
	22FF	1-2	Initialize the disk, bypass wraps
	FF00	1-2	Load DCP from diskette, bypass wraps

Notes:

1. *When instructed to load from diskette, use the MCODE DSKT 11 diskette.*

2. *The Configure, Customize, or Verify the System option shows the present configuration data (Verify the System), lets you change the configuration data (Configure), and then writes the configuration data to the disk (Customize).*

Service Procedures under SSP

The following table describes the service procedures under SSP. See the *System Reference* manual and the *Program Problem Diagnosis and Diagnostic Aids* manual for more information.

Key in This SSP Name	Press This Key	Description or Action
BSCTEST	Enter	Gives the prompt to perform the BSC online tests.
COMMTEST	Enter	Shows the menu with options to perform the basic communications diagnostic test.
ERAP	Enter	Shows the menu with options to display or print the following error log reports: • System summary • Elapsed time counters • Reports for all devices • Single reports by device
SDLCTEST	Enter	Gives the prompt to select options from menus to perform the SDLC online tests.
STATEST	Enter	Gives the prompt to select options from menus to perform the remote work station tests.
SYSTEST	Enter	Permits selection of exercisers to perform diagnostic testing of the system. No customer jobs can be running. • Disk exerciser • Diskette exerciser • Display station exerciser • Main storage processor exerciser • Printer exerciser • Communication exerciser
TESTDSKT	Help	Shows the menu with options to perform tests on the diskette drive and media.
TESTREQ	Enter	Shows the menu with options to perform: • Display verification • Work station printer verification • Configuration data • ERAP (reports associated with work stations)

Summary of Useful SSP Procedures

The following table describes useful SSP procedures. See the *System Reference* manual and the *Program Problem Diagnosis and Diagnostic Aids* manual for more information.

Key in this SSP Name	Press this Key	Description or Action
ALTERCOM	Help	Gives the prompt to change some communications parameters.
APAR	Help	Gives the prompt to generate APAR diskettes or to copy diagnostic information to disk or diskette.
BUILD	Enter	Displays the data on disk after a disk error with the option to correct the data.
COPYI1	Help	Gives the prompt to copy files from an SSP diskette to one or more other SSP diskettes with the same format.
D C or STATUS COMM	Enter	Displays the communications configuration data set by the ALTERCOM procedure.
D H or STATUS COMCNFIG	Enter	Displays the communications configuration data set by the SETCOMM procedure.
DFA	Help	Gives the prompt to print or display the selected system data areas from disk or from a diskette made by the APAR procedure.
DIAGCOPY	Enter	Copies files from any diagnostic diskette to one or more other diagnostic diskettes with the same format.
DIAGINIT	Enter	Initializes a diagnostic diskette.
DUMP	Help	Gives the prompt to select and print or display information from the dump file.
HISTCRT	Enter	Displays entries from the system history file.
HISTORY	Enter	Gives the prompt to display or print selected entries from the system history file.
ICFDEBUG	Help	Runs the SSP-ICF debug program.
ICVERIFY	Help	Gives the prompt to verify that an SSP-ICF subsystem is installed correctly.
INIT	Help	Gives the prompt to initialize a system (SSP) diskette.
OFF	Enter	Signs off the user.

Key in this SSP Name	Press this Key	Description or Action
PATCH	Enter	Shows the menu with options to patch selected disk or diskette sectors.
PROBLEM	Enter	Gives instructions to perform online problem determination.
PTF	Help	Gives the prompt to install or remove PTFs (program temporary fixes) or MPTFs (microcode program temporary fixes) to disk.
SERVICE	Help	Shows the menu with options to run service aid procedures.
SERVLOG	Help	Gives the prompt to add entries to the system service log.
SETCOMM	Help	Gives the prompt to change some communications parameters.
SETDUMP	Help	Gives the prompt to set the address compare dump values for programs running in main storage.
SMF	Help	Shows the menu with options to measure system actions.
SMFPRINT	Help	Gives the prompt to print a formatted report of the data collected by the system measurement program.
SMFSTART	Help	Gives the prompt to start the system measurement program.
SMFSTOP	Enter	Stops the system measurement program.
START	Help	Shows a menu that lets jobs run, start, or print. The option to start the system service authorization lets you specify a display station to be used to enter any procedure or command to service the system.
STOP	Help	Shows a menu that prevents jobs from running, starting, or printing. The option to start system service authorization lets you return a display station to its normal use.
TRACE	Help	Gives the prompt to keep a record of selected events on the system.
VARY	Help	Gives the prompt to change the status of a display station, a printer, the system printer, or the diskette drive to online or offline.

Preventative Maintenance

Perform the following preventative maintenance (PM) on the system unit on every hardware service call.

Unit	Operation
Power supply fan	Remove any dirt or obstructions around the fan.
Logic fan	Remove any dirt or obstructions around the fan.

Appendix A. Safety Inspection Guide

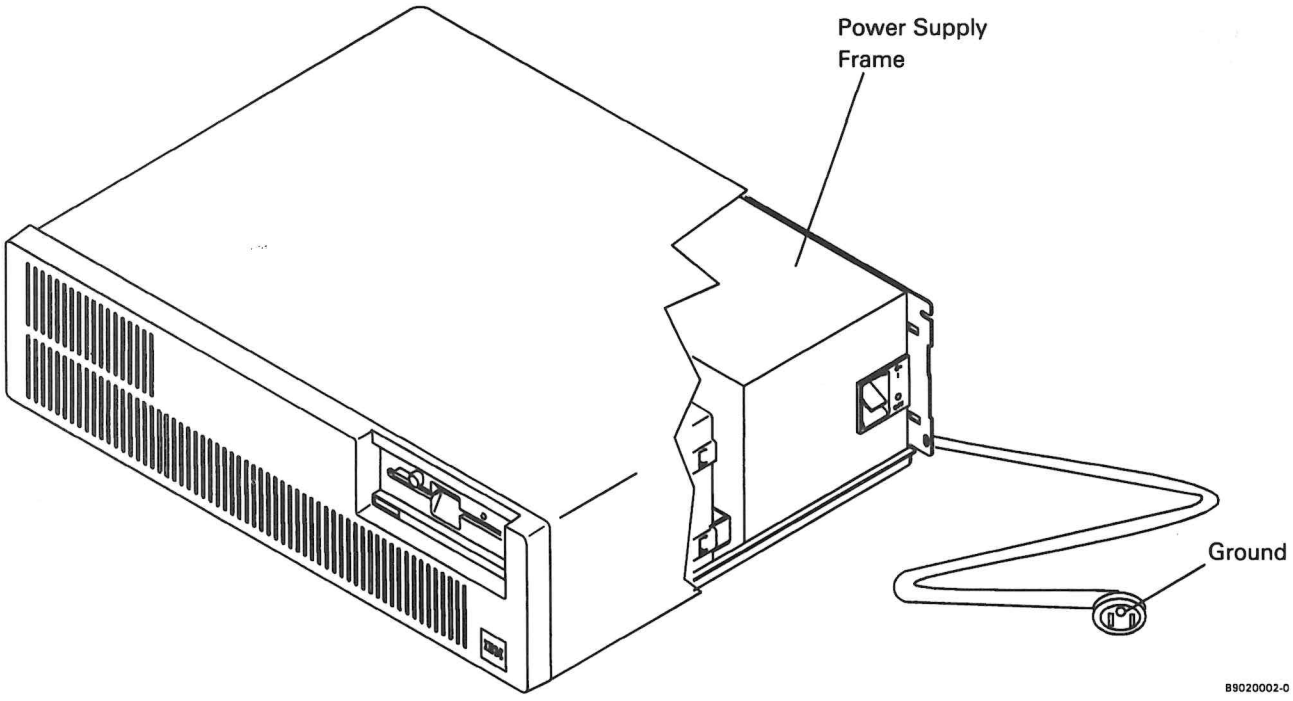
The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on this product. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgement should be used to identify potential unsafe conditions not covered by this inspection guide.

If any unsafe conditions are present, a determination must be made on how serious the apparent hazard could be and whether you can continue without first correcting the problem. For example, the following conditions are not safe:

- Electrical: In the primary power area, a frame that is not grounded
- Mechanical: Missing covers
- Other: Leaking capacitors or a damaged CRT face

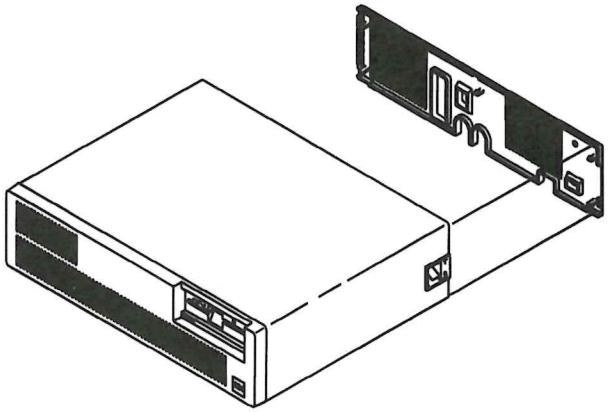
AC Power Cord

Check	Step
☐	Remove the power cord from the customer outlet.
☐	Check the power cord for visible cracks, wear, or damage.
☐	Check for 0.2 ohm or less of resistance between the power cord ground and the power supply frame.



Cover

Check	Step
☐	Ensure that the cover is not damaged and that no sharp edges are present.



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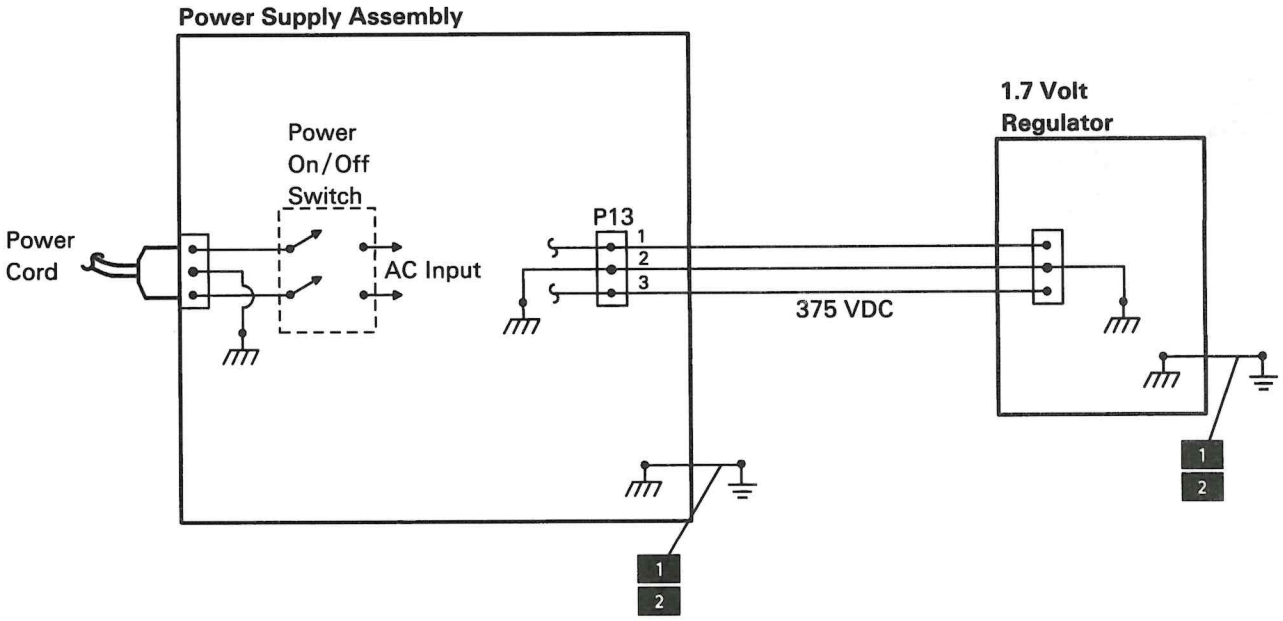
AC Safety Grounds

Check	Step
☐	Ensure that the power supply mounting screws are tight.
☐	Ensure that the screw that holds the 1.7 volt regulator to the frame is tight.

Note: The location of the AC safety ground screws is shown on "Safety Labels" on page A-5.



Legend:

1 Thread Forming Screw

2 Grounding Continuity by Direct Metal to Metal Contact

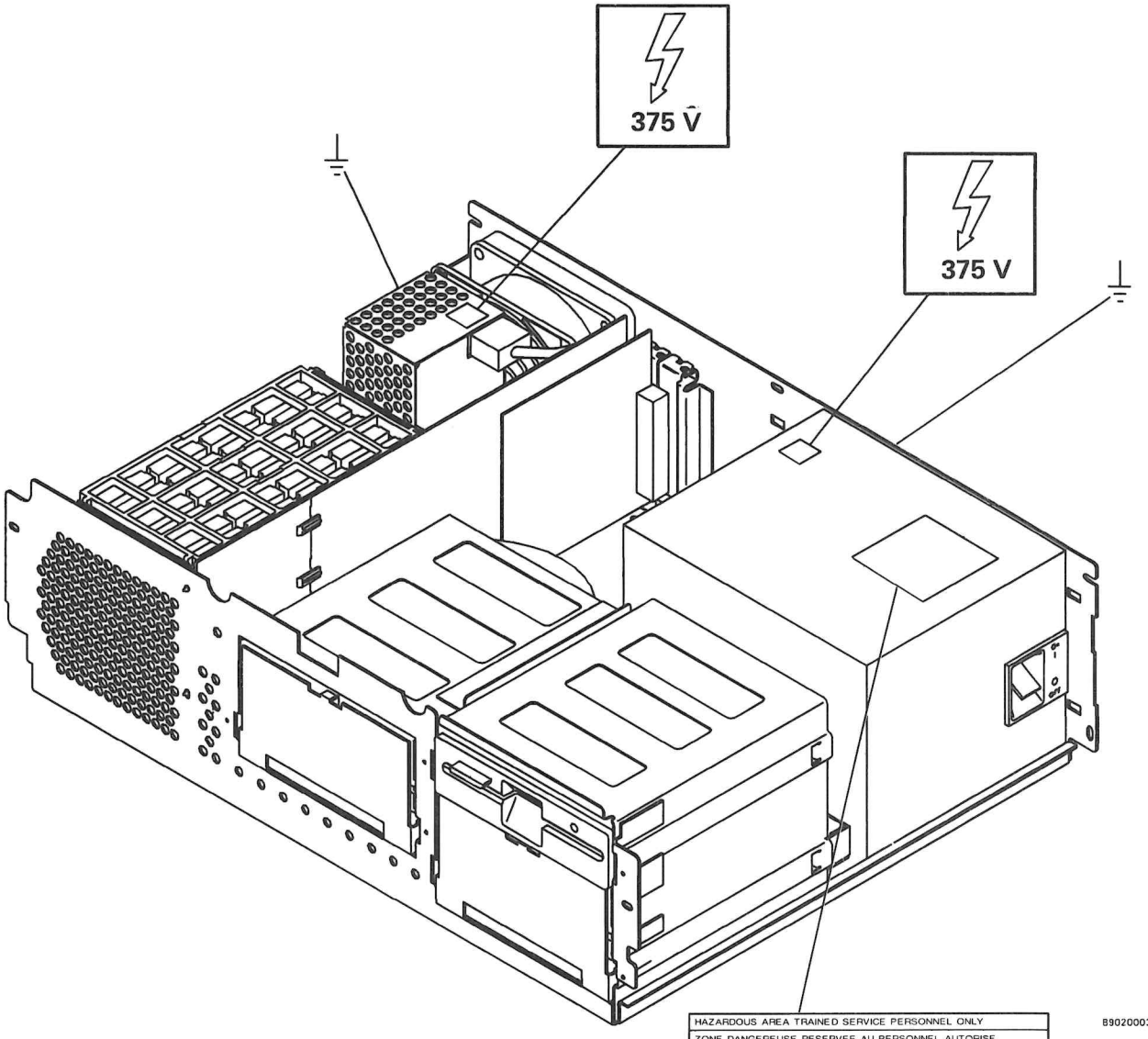
Chassis Ground

Frame or System Ground

B9020041-0

Safety Labels

Check	Step
☐	Ensure that the system has all of the safety labels shown below.



HAZARDOUS AREA TRAINED SERVICE PERSONNEL ONLY
ZONE DANGEREUSE RESERVEE AU PERSONNEL AUTORISE
ZONE DANGEREUSE PERSONNEL QUALIFIÉ SEULEMENT
GEFÄHRL. BEREICH. NUR FÜR FACHPERSONAL!
PERICOLO! SOLO PERSONALE ADDESTRATO
AREA PELIGROSA SOLO PERSONAL MANTENIMIENTO
ÁREA PERIGOSA SOMENTE PESSOAL TÉCNICO TREINADO
FARLIGT OMRADE ENDAST FÖR UTBILDAD PERSONAL
FARLIG OMRADE KUN FOR UTDANNET SEVICEPERSONELL
VAARALLINEN ALUE VAIN KOULUTETULLE HUOLTOHENKILOSTÖLLE
GEVAAR ENKEL VOOR BEVOEGD PERSONEEL
DANGER PERSONNEL AUTORISE SEULEMENT
危険個所　専門の技術員以外の取扱い禁止

Hazardous Area Label

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Appendix B. Working with ESD-Sensitive Cards

Many system logic cards are sensitive to electrostatic discharge (ESD). To prevent damage to ESD-sensitive logic cards, follow these instructions:

Note: An ESD handling kit (IBM part 6428316) can be ordered to provide additional protection when handling cards that are ESD-sensitive.

- Power off the system or device before removing logic cards.
- Keep the card in the original shipping container until you are ready to install the card in the machine.
- When holding logic cards, move your body as little as possible to prevent an increase of static electricity from clothing fibers, carpet fibers, and furniture.
- Hold the card by the edge or connector shroud (cover). Do not touch the pins. If you are removing a field-replaceable module, use the correct tool.
- Return the card to the special container when it is not being used. Do not place the card on the machine cover or on a metal table. Machine covers and metal tables are electrical grounds. They make a discharge path from the card through your body to ground, increasing the risk of damage to the card. Large metal objects can be discharge paths without being grounded.
- Prevent the cards from being accidentally touched by other persons. Reinstall machine covers when you are not working on the machine. Do not place unprotected cards on a table.
- Keep all cards in a metal case if possible.
- Be careful when working with cards during cold weather heating. Cold weather heating causes low humidity and increases the risk of static electricity.

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Glossary

This glossary includes terms and definitions from the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699.

A. Ampere.

ac. Alternating current.

ACR. Abandon call and retry.

ALT. Alternate (key).

alter. To change something. Same as *modify*.

ALTERCOM. Alter communications (configuration procedure). See also *SETCOMM*.

alternative cylinder. A cylinder on a diskette that is used by the system when the selected cylinder cannot be used.

alternative sector. A sector on a disk that is used by the system when the selected sector cannot be used.

APAR. Authorized program analysis report.

Attn. Attention (key).

authorized program analysis report (APAR). A request for correction of a problem caused by a defect in the present release of a program.

auto. Automatic.

backup. Pertaining to a system, device, or file that can be used in the event of a failure or loss of data. See *backup copy* and *backup diskette*.

backup copy. A copy of a file or data set that is kept for reference in the event the original file or data set is destroyed. See also *backup diskette*.

backup diskette. A diskette that contains information that was copied from a diskette or from disk. The backup diskette is used in the event the original information is accidentally altered or destroyed. See also *backup copy*.

batch. A group of records or jobs put together for processing or transmission.

batch file. A file containing one or more commands or program statements that DOS runs one at a time. All batch files have a file extension of .BAT.

binary synchronous communications (BSC). A type of line control with a set of rules for transmitting data over a communications line connecting two devices that use a communications adapter.

boot. See *bootstrap load*.

bootstrap load. To load PC DOS when a DOS diskette is in drive A or when DOS is stored on the first fixed disk and a diskette is not in drive A.

BSC. Binary synchronous communications.

BSCTEST. BSC online test (procedure). See also *COMMTEST*, *SDLCTEST*, and *STATEST*.

call. (1) A service call. (2) To activate a program or procedure at its entry point. (3) In data communications, the action performed by the calling person or station, or the operations necessary in making a call, or the effective use made of a connection between two stations.

Cmd. Command (key).

CNTLCOMM. Control communications (procedure).

COMCNFIG. Communications configuration.

COMM. Communications.

COMMTEST. Communications concurrent diagnostic test (procedure). See also *BSCTEST*, *SDLCTEST*, and *STATEST*.

completion code. See *condition code*.

condition code. A code that shows the results of a processing operation.

configure. To make or describe a configuration.

control storage directory. An area on disk that contains the address of all programs in the control storage library.

control storage library. An area on disk that contains the diagnostic programs that are loaded to control storage.

CSP. Control storage processor.

CSU. Customer setup.

CTRL. Control (key).

CTS. Clear to send.

customize. To update the unit definition table and system microcode on disk. See also *system customize utility*.

cycle steal (CS). The process by which a device uses cycles of another machine or device. If, for example, the processing unit is performing an ALU operation when the disk needs service, the ALU operation is stopped while a byte of data is moved to or from the disk.

data set ready (DSR). A communications signal that indicates the modem is ready to transmit or receive data.

data terminal equipment (DTE). The processing unit that uses data communications lines.

data terminal ready (DTR). An communications interface line that signals the modem when the terminal is ready to transmit or receive data.

DCE. Data communications equipment.

DCP. Diagnostic control program.

dedicated. (1) Pertaining to one application or purpose. (2) A time during maintenance when no customer jobs are running.

defect. (1) A failure. (2) A bad area on a disk, or diskette. (3) An error in a released program or program module.

DEL. Delete (key).

determination. See *problem determination*.

diagnostic control program (DCP). The supervisor program that controls diagnostic programs.

directory. See *control storage directory* and *diskette directory*.

diskette directory. An area of a diskette that contains the addresses of all records on the diskette.

DOS. Disk operating system (for the personal computer).

DSA. Data storage attachment/adapter.

DSR. Data set ready.

DTE. Data terminal equipment.

DTR. Data terminal ready.

dump. (1) To copy the contents of all or part of storage, usually from storage to an output device. (2) Data that has been dumped.

ERAP. Error recording analysis procedure.

ESC. Escape (key).

FRU. Field-replaceable unit.

Help. (1) A key on work station keyboards. (2) A display that gives additional information on the task you are performing. (3) A system procedure that displays a sequence of menus associated with system tasks.

hex. Hexadecimal.

ID. Identifier.

identifier (ID). A label or name that identifies something.

IL. Interrupt level.

initial program load (IPL). A sequence of events that loads the system programs and prepares the system to run jobs.

IPL. Initial program load.

K. 1024, when making reference to a quantity of data or data storage.

Kb. 1024 bytes. (Kb can also be displayed as KB.)

local storage register (LSR). A register used for general-purpose storage.

log. (1) A document containing written entries. (2) A system record containing recorded entries. (3) To write or record an entry in a log.

logged. Having written or recorded an entry in a log.

LSR. Local storage register.

M. 1 048 576, when making reference to a quantity of data or data storage. See also *megabyte*.

Mb. 1 048 576 bytes. (Mb can also be displayed as MB.) See also *megabyte*.

megabyte. 1 048 576 bytes, when making reference specifically to the storage size of a disk storage device. See also *M* and *Mb*.

memory. Storage.

modifier. Something that modifies or changes.

modify. To change something. Same as *alter*.

MS. Main storage.

MSP. Main storage processor.

multiple. More than one.

overcurrent. A condition that occurs when power supply current is too high.

overview. A summary.

PC. Personal computer.

POR. Power-on reset.

problem determination. The process of identifying why the system is not working. Often this process identifies programs, hardware, data communications equipment, or user errors as the source of the problem.

R/W. Read/write.

RAM. Random access memory.

reload. To load again.

retry. An attempt to perform an operation a specified number of times, or until the operation is completed. See also *ACR*.

ROS. Read-only storage.

RPQ. Request for price quotation.

RTS. Request to send.

RWS. Remote work station.

SDLC. Synchronous data link control.

SDLCTEST. SDLC online test (procedure). See also *BSCTEST*, *COMMTEST*, and *STATEST*.

SETCOMM. Set communications (configuration procedure). See also *ALTERCOM*.

SNA. Systems network architecture.

SRC. System reference code.

SSP. System support program product.

STATEST. Station test (procedure). See also *BSCTEST*, *COMMTEST*, and *SDLCTEST*.

supervisor call (SVC). An instruction that causes control to be passed to the control storage processor.

SVC. Supervisor call.

synchronous data link control (SDLC). Rules that control data movement over a communications line connecting two devices that use a communications adapter.

Sys Req. System Request (key).

system customize utility. A utility under dedicated DCP that lets you update the system microcode on disk, using the diagnostic diskettes.

system reference code (SRC). A 4-character code displayed as part of a system message, as part of a diagnostic message, or displayed on the operator/CE display.

systems network architecture (SNA). An IBM communications protocol for controlling information transfer in a data communications network.

SYSTEST. System test.

task. A unit of work.

TESTDSKT. Test diskette drive and diskettes (procedure).

TESTREQ. Test request (procedure).

twinaxial cable. A twisted-pair shielded cable that connects a keyboard/display or work station printer to the system.

UDT. Unit definition table.

unit definition table (UDT). An area on disk or in storage that contains entries that describe the devices that run under control of the SSP.

V. Volt.

Vac. Volts, alternating current.

Vdc. Volts, direct current.

wrap tests. I/O device diagnostic tests that are run when the Load key is pressed.

WS. Work station.

Appendix J. Parts Catalog

How to Use This Parts Catalog J-3
Figure 1. Cover Assembly J-7
Figure 2. Final Assembly J-8
Figure 3. Drive Assembly J-9
Figure 4. Regulator Assembly J-10
Figure 5. Card Assembly J-11
Figure 6. Card Connector Assembly J-12
Figure 7. Line Cord Chart J-13
Numerical Index J-14

Part I

To find parts quickly, a general understanding of the structure of this catalog is necessary. The catalog is divided into three major sections:

- The Visual Index, containing overall views of the machine, with call-outs pointing to detailed figures.
- The Catalog Section, containing a pictorial breakdown of assemblies and subassemblies.
- The Numerical Index, which is a numerical list of all parts used in the machine, with cross-references to the figure on which the part is found.

VISUAL INDEX
The Visual Index, located before the Catalog Section, contains a reduced illustration of every figure in the Catalog Section. The reduced illustrations are tied together with flow arrows to form a natural progression from large assemblies to small assemblies and possibly subassemblies. In effect, a visual table of contents is formed by the Visual Index illustrations.

CATALOG SECTION
The Catalog Section contains the full-sized illustrations previously noted in the Visual Index. Index numbers on figures refer to corresponding entries in the Group Assembly Parts List accompanying each figure. Refer to part II for explanation of terms used in the Group Assembly Parts List.

NUMERICAL INDEX
The Numerical Index is located after the Catalog Section and contains a complete list, in numerical order, of all part numbers used on the machine. Listed with the part number is the index and figure number on which the part is illustrated. The numerical index makes it possible to locate a part when only the part number is known.

STACKED INDEX NUMBERS
Stacked Index numbers are used when showing a part and its attaching hardware. The circled index number indicates the assembly is broken down within the figure.

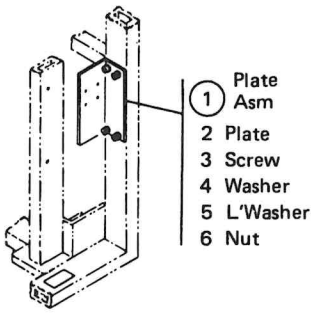

ILLUSTRATION NOTES
Cross-reference notes are directly on the illustration. The illustration's next higher assembly reference, normally located in the upper left corner of the page will read: "For Parts Not Shown See Figure X". If an assembly is referenced to a lower level figure, the note located next to the index number will read: " 5 See Figure X."

DOUBLE LINED DETAIL BOX
The double lined box differentiates between parts shown on the basic model and parts related to a level and/or feature difference. An explanation of the level or feature difference is given in the double lined box.

FINDING A PART
The Visual Index is the starting point for locating a part. The illustrations in the Visual Index are reduced versions of all illustrations in the Catalog Section; therefore, the illustrations can be used to find the assembly containing the desired part. Use references to the detailed figure in the Catalog Section, or to another Visual Index illustration, to determine location of part number.

Once the detailed figure in the catalog section is determined, finding the part on the figure and referring to the listing for the part number and description is all that is required in most cases. If the first catalog section figure referenced shows the assembly containing the required part, the index number for the assembly will reference a lower-level figure where the assembly is broken down to its component parts. If the figure referenced by the Visual Index contains neither the part nor an assembly containing the part, it is then necessary to go to the next higher assembly figure. This figure should then contain the part or an assembly containing the part; if not, an even higher level figure must be used. Refer back to the Visual Index for some other figure that could show the desired part.

Note: Many detailed parts are unavailable, because they are part of an inseparable assembly (two or more parts welded or bonded together), or because they are part of an assembly purchased as a unit. If the part is found on a purchased assembly, and the detail parts of this assembly do not have IBM part numbers, in either case, you need to obtain the part number of the assembly, rather than the detailed part.

EXAMPLE FOR ORDERING PARTS

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION FOR FIGURE 25 1 2 3 4
25	2592881		FAN ASM,60 HZ
- 1	2172166	1	• GUARD
- 2	2591483	AR	• SEAL
- 3	2592692	1	• BRACKET
- 4	2591431	1	• FAN ASM
- 5	334932	1	• • RING,TERMINAL
- 6	1166117	1	• • CONNECTOR
- 7	1166114	3	• • TERMINAL
- 8	2591402	1	• • FAN

If the entire fan is required, part number **2592881** should be ordered (all one dot items will be received). If only the subassembly is required, part number **2591431** should be ordered (all two dot items will be received). Each part may be ordered individually.

Note: If you order a part that requires a label, make sure you order the label in the correct langauge. For example: A part of a Quebec machine should have a French Canadian language label rather than a French language label.

Part II

(A) *AR*
As Required (AR) in the units per assembly column denotes that the quantity is used as required.

(B) *INDENTURE*
The relationship of a part to its next higher assembly is indicated by indentures. For example:

1 2 3 4
Unit
. Assemblies and Detail Parts of Unit
. Attaching Parts for Assemblies & Detail Parts
. . Subassemblies
. . Attaching Parts of Subassemblies
. . . Detail Parts for Subassemblies, etc.

(C) *NR*
The NR in the part number column denotes the part is procurable but not recommended for field replacement, and that the next higher assembly should be ordered.

(D) *NP*
The entry NP in the part number column denotes the assembly is non-procurable and the detail parts should be ordered separately.

(E) *NO NO.*
When this indication appears in the part number column, it denotes a group of parts for which no assembly part number has been assigned, and the detail parts should be ordered separately.

EXAMPLE OF PARTS LIST

FIGURE-INDEX NUMBER	PART NUMBER	UNITS PER ASM.	DESCRIPTION FOR FIGURE 5 1 2 3 4
5 (E)	NO NO. (C)	(B)	BEZEL AND OPERATOR PANEL ASSEMBLY
- 1	2767400	1	. Bracket, LED and Switch
- 2	7362104 NR	1	. Potentiometer
- 3	7363983	1	. Potentiometer
- 4	7362299	2	. Knob Asm
- 5	8330754 (A)	5	. LED, Light
- 6	5552875	1	. Block, LED
- 7	1621811	AR	. Clip
- 8	1940	5	. Screw, Thd Form-hex Wshr Hd 6-19 x 1/2 Lg
- 9	5552875 (D)	1	. Cable Asm, CE Diag Ind and Switch
- 10	7362322	1	. Cable Asm, AC Distribution
- 11	7362939	1	. . Switch
- 12	2767401 NP	1	. Bezel, English
- 12	7364967 NP	1	. Bezel, French
- 12	7362142 NP	1	. Bezel, Japanese
- 12	2767391 NP	1	. Bezel, Spanish
- 12	8330738 NP	1	. Bezel, German
- 12	515661 NP	1	. Bezel, Italian

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Catalog Section

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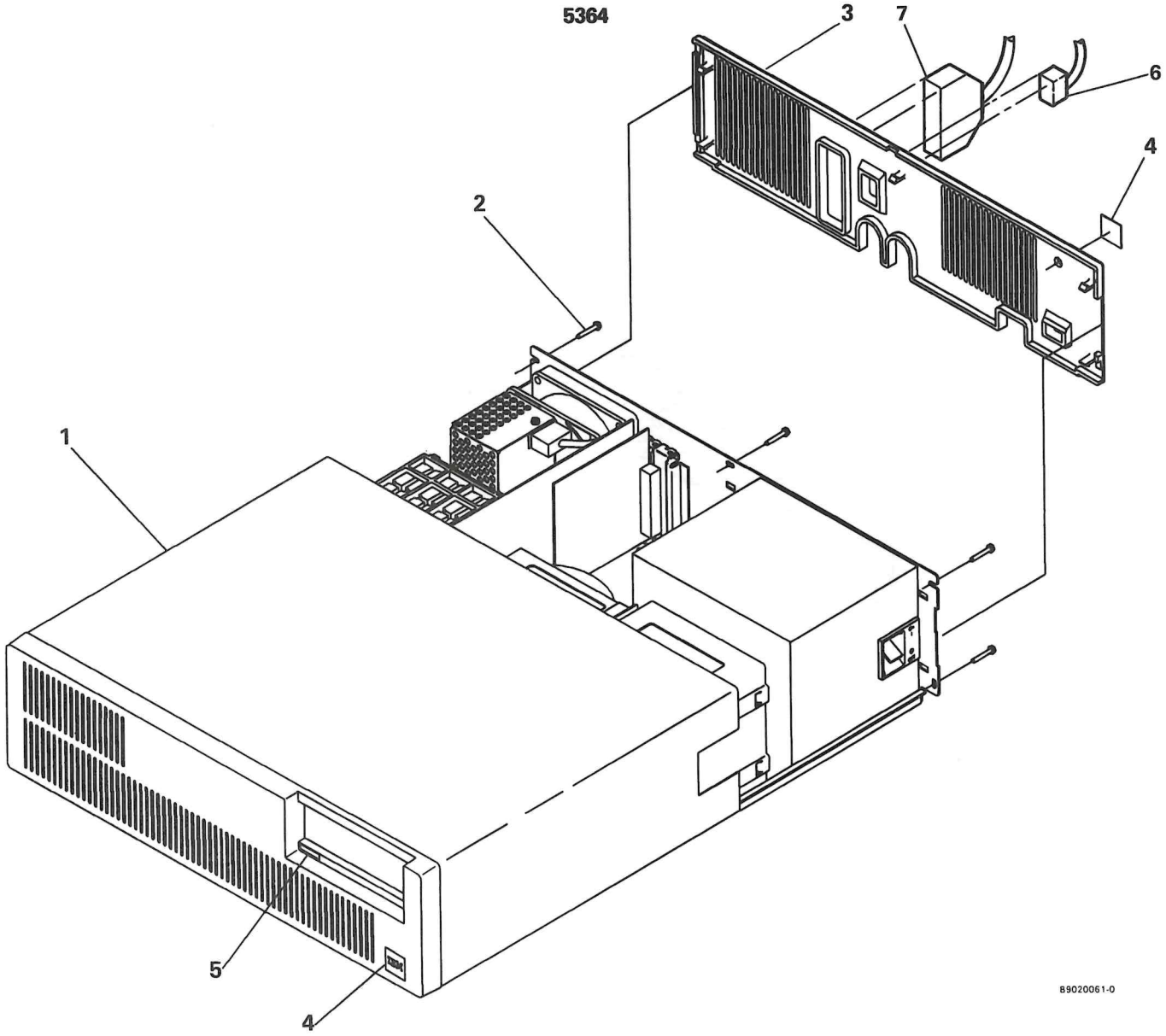
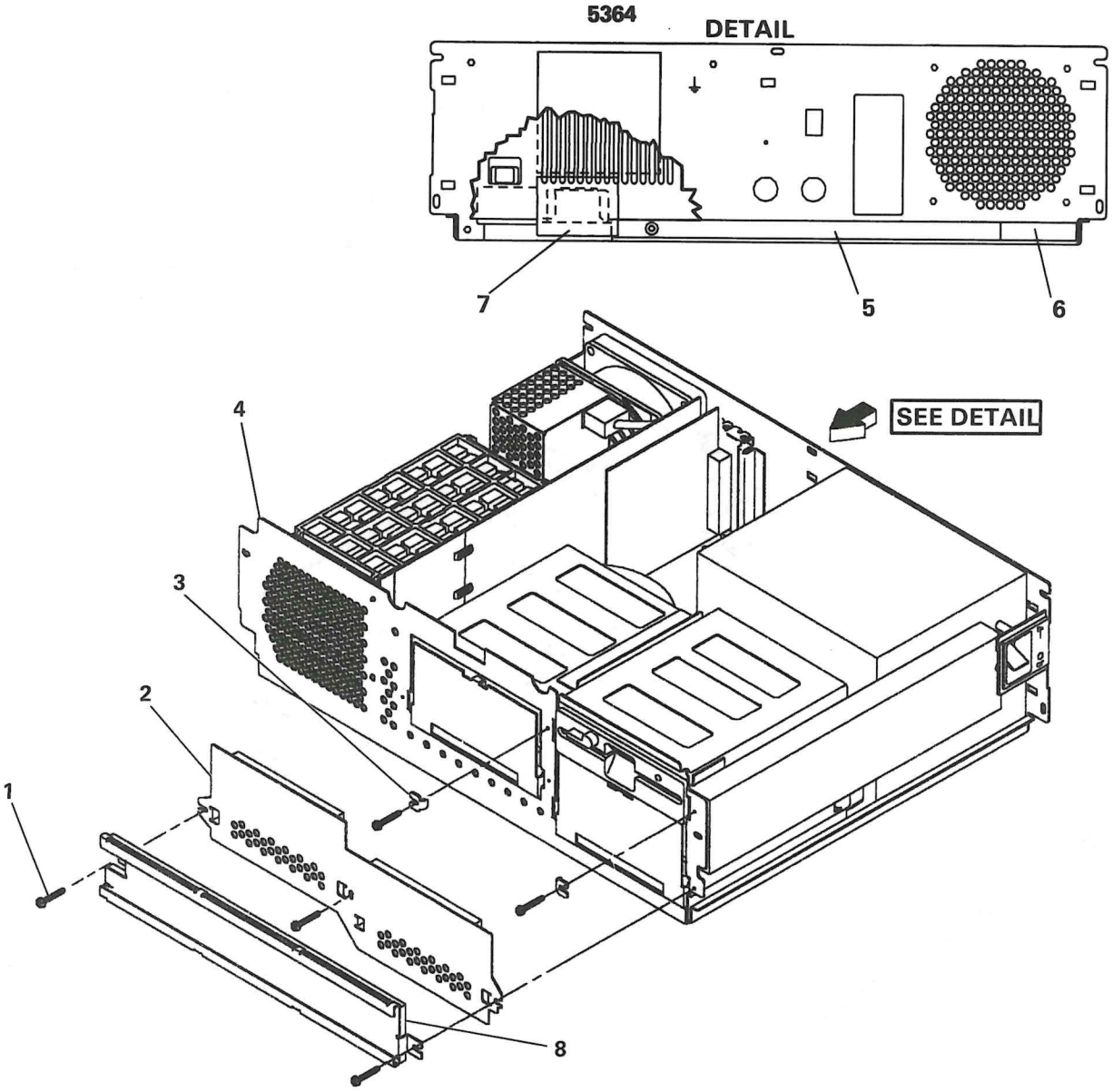


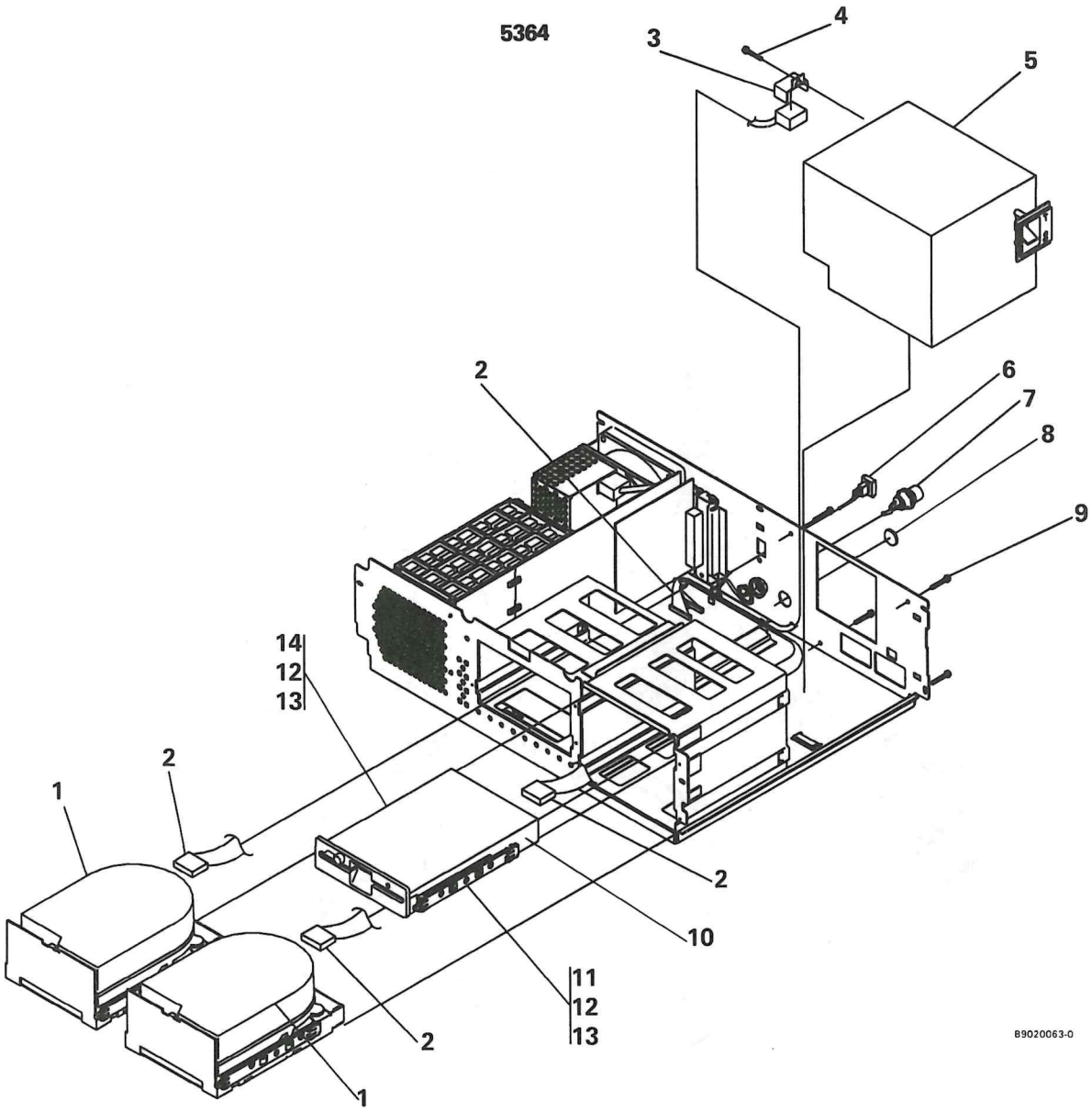
INDEX NUMBER	PART NUMBER	UNITS /ASM	1 2 3 4 DESCRIPTION FOR FIGURE 1
1	NO NO.		COVER ASSEMBLY
- 1	8266574	1	• Cover
- 2	5319854	5	• Screw,Thd-Form Hex Wshr Hd 8-32 x 3/8 Lg
- 3	8331152	1	• Back Cover
- 4	8331191	2	• Logo
- 5	8331189 NR	1	• Serial Number Plate - U.S.
- 5	8331190 NR	1	• Serial Number Plate - Italy
- 6	xxxxxxx	1	• Line Cord (see Line Cord Chart on J-13)
- 7	8266528	1	• Expansion Cable
- 7	59X4072	1	• Expansion Cable (10 ft. feature)

Figure 1. COVER ASSEMBLY (Part 1 of 1)



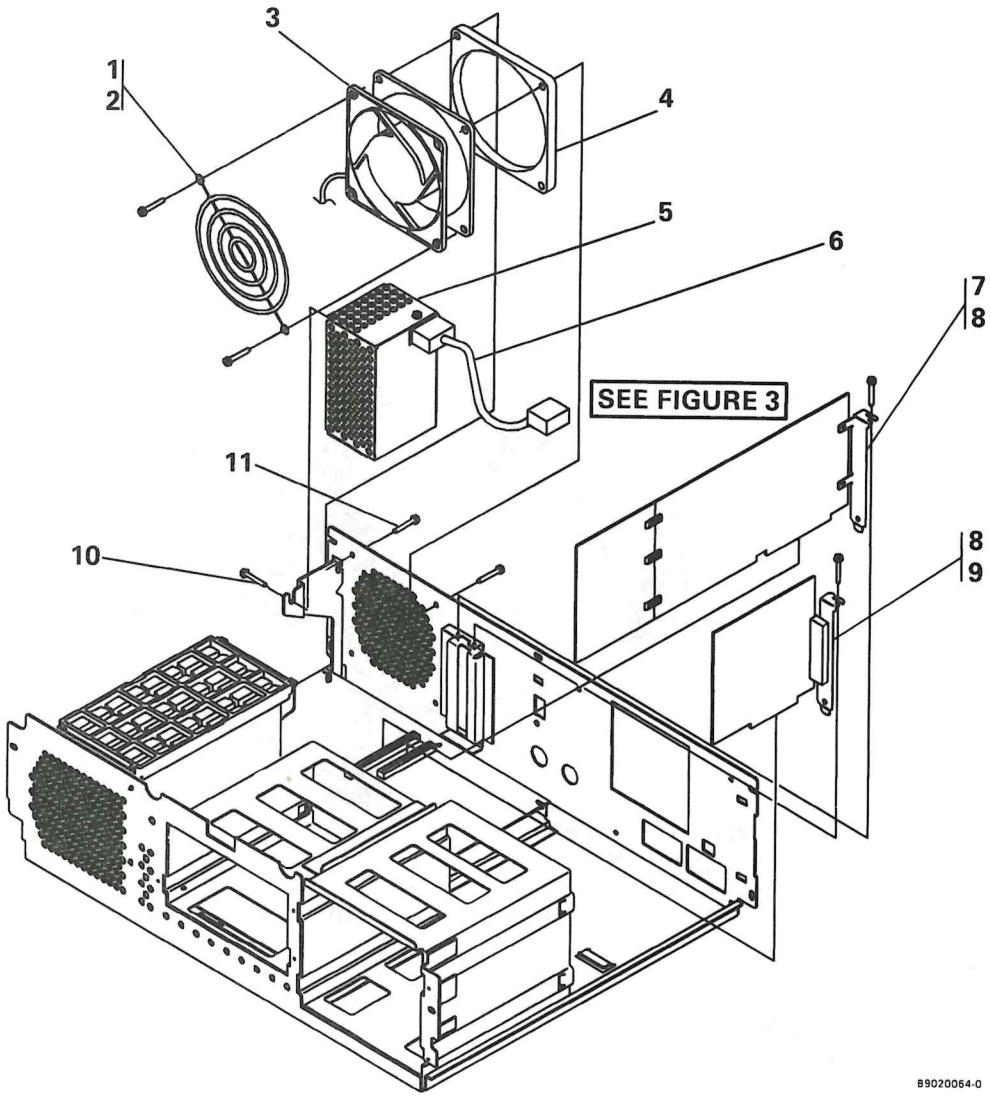
INDEX NUMBER	PART NUMBER	UNITS /ASM	1 2 3 4 DESCRIPTION FOR FIGURE 2
2	NO NO.		FINAL ASSEMBLY
- 1	1680440	5	• Screw,Thd-Form Hex Wshr Hd 6-32 x 5/16 Lg
- 2	6369737	1	• Retaining Plate
- 3	4236946	2	• Clip
- 4	4236930 NP	1	• Base
- 5	8331181 NP	1	• Label - Bar Code Combination,
- 5			U.S. & Canada, 1 hard file
- 5	8331182 NP	1	• Label - Bar Code Combination,
- 5			U.S. & Canada, 2 hard files
- 5	8331183 NP	1	• Label - Bar Code Combination,
- 5			Non-U.S. & Canada, 1 hard file
- 5	8331184 NP	1	• Label - Bar Code Combination,
- 5			Non-U.S. & Canada, 2 hard files
- 6	8331187 NP	1	• Serial Number Bar Code - U.S.
- 6	8331188 NP	1	• Serial Number Bar Code - Italy
- 7	8331177 NP	1	• Voltage Label
- 8	6203646	1	• Deflector Assembly

Figure 2. FINAL ASSEMBLY (Part 1 of 1)



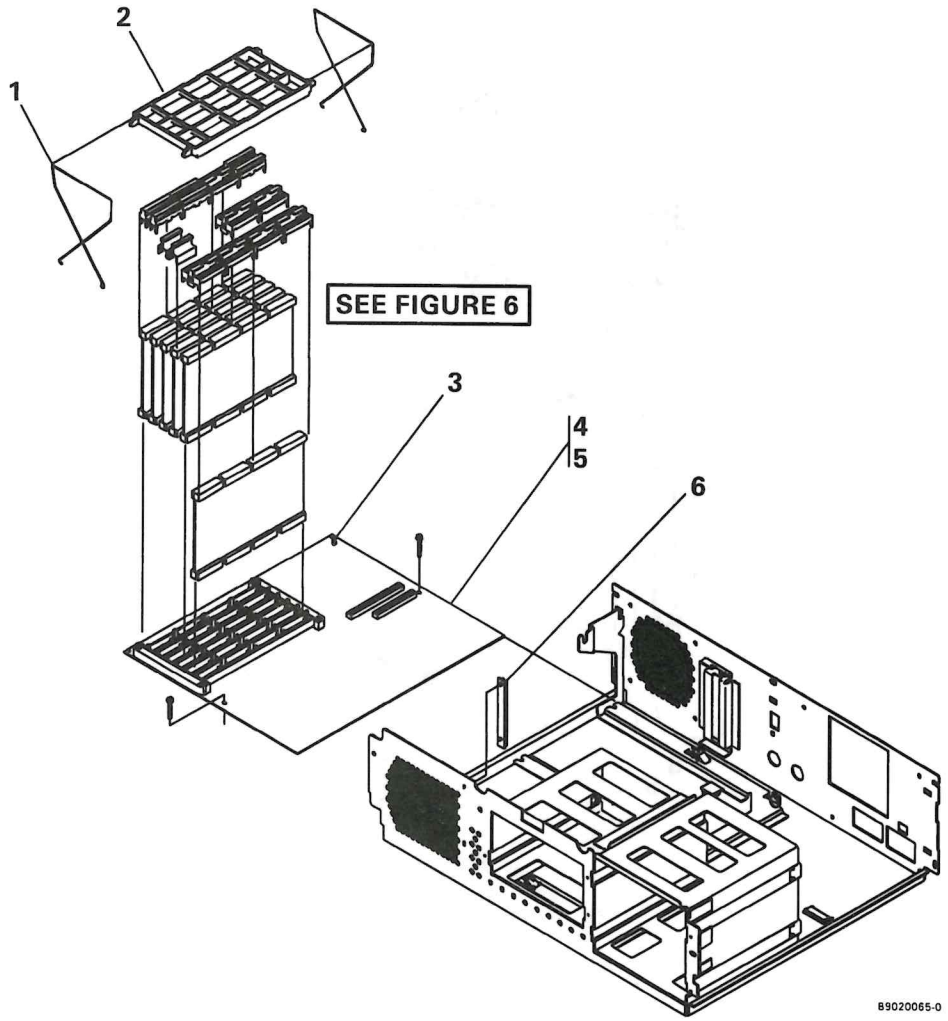
INDEX NUMBER	PART NUMBER	UNITS /ASM	1 2 3 4 DESCRIPTION FOR FIGURE 3
3	NO NO.		DRIVE ASSEMBLY
- 1	4842971	2	• Hard File Assembly - (2nd hard file
- 1			is optional)
- 2	8266533	1	• Disk/Diskette Cable Assembly
- 3	8264169	1	• Power Supply Bracket
- 4	740501	1	• Screw,Thd-Form Hex Wshr Hd 6-32 x 1/4 Lg
- 5	6133532	1	• Power Supply
- 6	8266557	1	• Dump Switch
- 7	8266583	1	• Coaxial Workstation Connector
- 8	4233987	1	• Plug
- 9	1680440	4	• Screw,Thd-Form Hex Wshr Hd 6-32 x 5/16 Lg
- 10	1685538	1	• Diskette Drive Assembly (without rails)
- 11	4234579	1	• Diskette Drive Rail (right-side)
- 12	4234583	1	• Spring
- 13	1621171	2	• Screw,Mach-Slot Pan Hd M3 x .5 x 8 Lg
- 14	4234580	1	• Diskette Drive Rail (left-side)

Figure 3. DRIVE ASSEMBLY (Part 1 of 1)



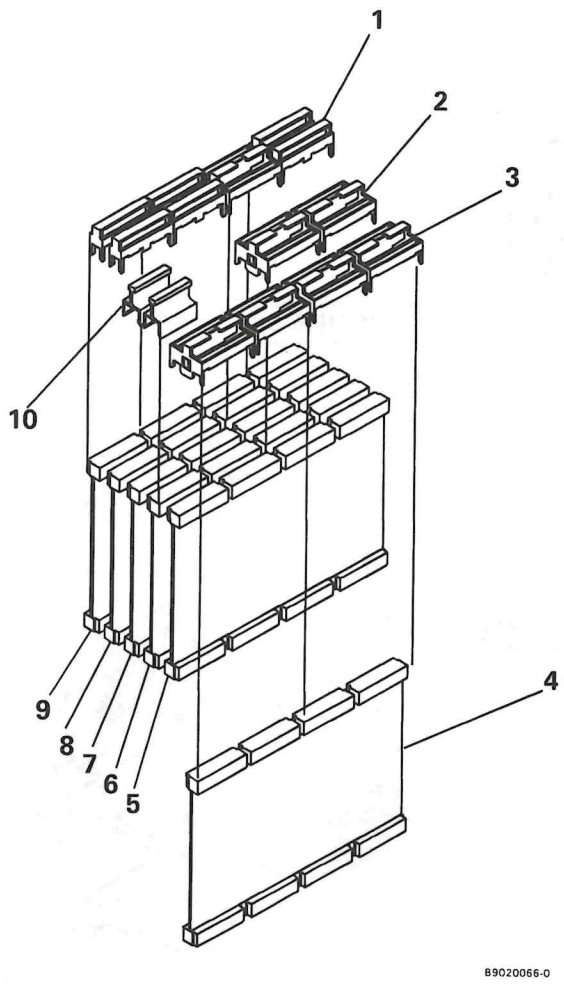
INDEX NUMBER	PART NUMBER	UNITS /ASM	1 2 3 4 DESCRIPTION FOR FIGURE 4
4	NO NO.		REGULATOR ASSEMBLY
- 1	2546641	1	• Fan Guard
- 2	5319854	2	• Screw,Thd-Form Hex Wshr Hd 8-32 x 3/8 Lg
- 3	4236949	1	• Fan
- 4	4202287	1	• Spacer
- 5	8264168	1	• 1.7V Regulator
- 6	8264176	1	• Cable Assembly
- 7	xxxxxxx	1	• Memory Card Assembly (use part number
- 7			from SRC list)
- 8	1680440	2	• Screw,Thd-Form Hex Wshr Hd 6-32 x 5/16 Lg
- 9	xxxxxxx	1	• Driver Receiver Card (use part number
- 9			from SRC list)
- 10	1680440	1	• Screw,Thd-Form Hex Wshr Hd 6-32 x 5/16 Lg
- 11	2181002	4	• Screw,Thd-Form Hex Wshr Hd 8-32 x 3/4 Lg

Figure 4. REGULATOR ASSEMBLY (Part 1 of 1)



INDEX NUMBER	PART NUMBER	UNITS /ASM	1 2 3 4 DESCRIPTION FOR FIGURE 5
5	NO NO.		CARD ASSEMBLY
- 1	4236922	2	• Retainer Wire
- 2	4236921	1	• Connector Cover
- 3	4236929	1	• Standoff
- 4	xxxxxxx	1	• Planar (use part number from SRC list)
- 5	1680440	2	• Screw,Thd-Form Hex Wshr Hd 6-32 x 5/16 Lg
- 6	8266576	1	• Card Guide

Figure 5. CARD ASSEMBLY (Part 1 of 1)



INDEX NUMBER	PART NUMBER	UNITS /ASM	1 2 3 4 DESCRIPTION FOR FIGURE 6
6	NO NO.		CARD CONNECTOR ASSEMBLY
- 1	4138510	6	• Card Connector
- 2	6819193	3	• Card Connector
- 3	6819211	4	• Card Connector
- 4	xxxxxxx	1	• MSP Data Flow Card (use part number from SRC list)
- 4			
- 5	xxxxxxx	1	• MSP Control Card (use part number from SRC list)
- 5			
- 6	xxxxxxx	1	• CSP Card (use part number from SRC list)
- 7	xxxxxxx	1	• Work Station Adapter Card (use part number from SRC list)
- 7			
- 8	xxxxxxx	1	• Data Storage Adapter Card (use part number from SRC list)
- 8			
- 9	xxxxxxx	1	• Disk Adapter Card (use part number from SRC list)
- 9			
- 10	6369779	2	• Card Connector

Figure 6. CARD CONNECTOR ASSEMBLY (Part 1 of 1)

Line Cord Chart

Plug	Line Cord P/N	Country
	2453011	6 Ft. Lg., U.S., (All including Chicago)
	6952300	8 Ft. Lg. Bahamas, Canada, Japan (60Hz), Japan (50 Hz), Bermuda, Brazil, Cayman Island (BWI), Columbia, Costa Rica, Dominican Rep., Ecuador, El Salvador, Guatamala, Guyana, Haiti, Honduras, Korea (South), Mexico, Netherland Antilles, Nicaragua, Panama, Philipines, Surinam, Taiwan, Trinidad **Venezuela**
	1838574	Barbados, Jamaica, Netherland Antilles, Peru, Thailand
No Plug	4437620	50Hz Indonesia, Papua New Guinea
	6952374	Italy, Chile
	6952365	Liechtenstein, Switzerland
	6952329	Denmark
	6952383	Israel
	6952347	Pakistan, South Africa
	6952356	Bahrain, Cyprus, Hong Kong, India, Ireland, Kenya, Kuwait, Malasia, Oman, Qatar, Saudi Arabia, Sierra Leone, Singapore, United Kingdom
	6952320	Austria, Belgium, Bolivia, Bulgaria, Finland, France, Germany, Iceland, Lebanon, Netherlands, Norway, Paraguay, Portugal, Spain, Sweden, Turkey, Uruguay, Yugoslavia
	6952311	Australia/New Zealand, Argentina

Figure 7. LINE CORD CHART (Part 1 of 1)

NUMERICAL INDEX

PART NUMBER	LIST AND INDEX NO.
740501	3 - 4
xxxxxxx	1 - 6
xxxxxxx	4 - 7
xxxxxxx	4 - 9
xxxxxxx	5 - 4
xxxxxxx	6 - 4
xxxxxxx	6 - 5
xxxxxxx	6 - 6
xxxxxxx	6 - 7
xxxxxxx	6 - 8
xxxxxxx	6 - 9
1621171	3 - 13
1680440	2 - 1
1680440	3 - 9
1680440	4 - 8
1680440	4 - 10
1680440	5 - 5
1685538	3 - 10
2181002	4 - 11
2546641	4 - 1
4138510	6 - 1
4202287	4 - 4
4233987	3 - 8
4234579	3 - 11
4234580	3 - 14
4234583	3 - 12
4236921	5 - 2
4236922	5 - 1
4236929	5 - 3
4236930	2 - 4
4236946	2 - 3
4236949	4 - 3
4842971	3 - 1
5319854	1 - 2
5319854	4 - 2
59X4072	1 - 7
6133532	3 - 5
6203646	2 - 8
6369737	2 - 2
6369779	6 - 10
6819193	6 - 2
6819211	6 - 3
8264168	4 - 5
8264169	3 - 3
8264176	4 - 6
8266528	1 - 7
8266533	3 - 2
8266557	3 - 6
8266574	1 - 1
8266576	5 - 6
8266583	3 - 7
8331152	1 - 3
8331177	2 - 7
8331181	2 - 5
8331182	2 - 5
8331183	2 - 5
8331184	2 - 5
8331187	2 - 6
8331188	2 - 6
8331189	1 - 5
8331190	1 - 5
8331191	1 - 4

Appendix L. Service Log

Machine Type and Serial

Date	Description of Problem/Action Taken (Do not record hours or part numbers.)	Service Name

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